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Epidemiological and Clinical Aspects of Abnormal Movements in Children from 2 Months to 15 Years in the Pediatric Department of Gabriel Toure University Hospital Centre of Bamako

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Abstract

Introduction: Abnormal or involuntary movements correspond to a disorder in the programming and/or execution of movement. They have two characteristics; they are hardly or not at all controlled by the will and occur in the absence of any paralysis. **Objective:** To determine the epidemiological, clinical and etiological characteristics of abnormal (involuntary) movements in children aged 2 months to 15 years. **Patients and Methods:** This was a prospective, descriptive study from January 2016 to December 2018 of children aged 2 months to 15 years seen in neuropediatric consultations for abnormal movements. **Results:** During the study period 1920 children were seen in neuropediatric consultations and 57 presented with abnormal movements, *i.e.* a frequency of 2.96%. Children aged between 6 and 60 months were the most affected (54.4%). The sex ratio was 1.53. Movement abnormality was the most common reason for consultation (45.7%), followed by apyretic convulsions (28%), and laxity (5.3%). The onset was progressive in 68.4% of children. The main types of abnormal movements were chorea (31.6%), dystonia (26.3%), myoclonus (17.5%), tremor in 10.5%. The causes were infectious (73.68%). **Conclusion:** Abnormal movements are rare in paediatric practice. They have multiple causes and their management is urgent in certain situations that can jeopardise the future of children.

Keywords

Abnormal Movements, Convulsions, Children, Bamako

1. Introduction

Abnormal or involuntary movements correspond to a disorder in the programming and/or execution of movement, generally (but not exclusively) originating in a dysfunction, lesion or degenerative pathology of the basal ganglia system, also known as the extrapyramidal system, as opposed to the common pathway of voluntary execution of movement, which is the pyramidal system, and therefore have two characteristics: they are little or not controlled by the will and they come about in the absence of any paralysis. Significant advances in the fields of neuropharmacology, molecular biology, genetics and neuroradiology have contributed to a better understanding of this disease [1] [2]. Despite this progress, there are still some grey areas. These concern the pathophysiological mechanisms and the aetiologies which are not fully established. The pathology of involuntary movements is not exceptional. In fact, routine paediatric consultations offer opportunities to observe children with clinical pictures compatible in their manifestation with a movement pathology in the absence of any motor deficit [3]. Abnormal movements are not exceptional in children. Their occurrence at this particular age, during which the brain is in full development and maturation, gives them certain specific characteristics, both from the semiological and etiological point of view and with regard to their management [4]. The frequency and nature of involuntary movements described in children have not been the subject of in-depth exhaustive study in sub-Saharan Africa. The present work aims to study the epidemiological, clinical and etiological characteristics of involuntary movements in children in the paediatric department of the Gabriel Toure University Hospital Centre.

2. Patients and Methods

This is a cross-sectional, descriptive and prospective study carried out in the paediatric department of the Gabriel Toure University Hospital Centre from January 2016 to September 2018 and covering children seen at the consultation or hospitalised for abnormal movements. Children aged 2 months to 15 years with abnormal movements whose parents agreed to be included were included. Children whose parents refused inclusion and children with cerebral palsy were not included. Children with dyskinesia secondary to medication were also excluded from our study. Operational definition: Abnormal or involuntary movements correspond for our study to a disorder of programming and/or execution of movement which will be classified as follows: tremor, chorea, dystonia, athetosis, myoclonus, tics and dyskinesia.

The data were collected from questions asked to the parents on a survey form prepared for this purpose. The variables studied were age, sex, residence, parents' profession, personal and family history, clinical examination (general condition, weight, height, temperature), clinical presentation, mode of installation, topography of the initial stroke, complementary examinations (cerebral CT, electroencephalogram, cytobacteriological examination of the CSF), and therapeutic

conduct.

Data were entered and analysed on SPSS (Statistical package for the Social Science) version 18.0, United States. Ethical aspects and good clinical practices were respected.

3. Results

During the study period 1920 children were seen in neuropediatric consultations and 57 presented with abnormal movements, *i.e.* a frequency of 2.96%. Children aged 6 months to 60 months were the most affected (54.4%) (Table 1). The sex ratio was 1.53 (Table 1). Movement abnormality was the most common reason for consultation (45.7%), followed by apyretic convulsions (28%), and laxity (5.3%) (Table 2). The onset was progressive in 68.4% of children. The main types of abnormal movements were chorea (31.6%), dystonia (26.3%), myoclonus (17.5%), tremor in 10.5%. The disease was global in 56% of cases (Table 3). The causes were infectious (73.68%). The majority of our children had generalized movements (56.1%) followed by upper limb (15.8%) and head (12.3%) involvement. Brain CT scans performed in 35/57 children were abnormal in 54.2% of cases. The electroencephalogram found abnormalities in 21/57 (42.1%).

Table 1. Distribution of patients according to socio-demographic characteristics.

Variables		Number	Frequency (%)
Sex	Male	32	56.10
	Feminin	25	43.90
Years	Less than 5 years	31	54.40
	5 to 10 years	17	29.80
	10 to 15 years	9	15.80

Table 2. Breakdown by reason for consultation.

Reason for consultation	Number	Frequency (%)
Agitation	2	3.5
Ataxia	3	5.3
Apyretic convulsion	16	28
Febrile convulsion	3	5.3
Hemiplegia	2	3.5
Abnormal movements	26	45.7
Cervical stiffness	1	1.8
Psychomotor retardation	2	3.5
Head trauma	1	1.8
Behavioural disorder	1	1.8
TOTAL	57	100

Table 3. Breakdown by type of anormal movement.

Types of movements	Workforce	Frequency (%)
Tremor	6	10.5
Choreic movement	1	31.6
Dystonia	15	26.3
Myoclonus	10	17.5
Tics	3	5.2
choreoathetosis	5	8.8
Total	57	57

Table 4. Breakdown by etiology.

Etiologies	Workforce	Frequency (%)
Encephalitis	18	31.57
Meningoencephalitis	08	14.03
Cerebral Malaria	08	14.03
Meningitidis	06	10.52
Infectious choreas	03	5.26
HIV	02	3.50
Epilepsies	07	12.28
Brain tumors	02	3.50
Indeterminate	03	5.26
Total	57	100

Lumbar puncture was abnormal in 33 children (57.8%).

The main etiologies were encephalitis (42.8%), meningoencephalitis (19%), neuromalaria (19%) and HIV (4.7%). Lepilepsy was found in 12.2% of patients (Table 4). We found a pyramidal syndrome with spasticity in 40.4% of our children, especially in those with dystonia.

The main treatments received were neuroleptics in 89.5% of cases and corticosteroids in 70% of cases. The outcome was favourable in 86% of cases and stationary in 14%. Evolution: The evolution was favourable in 86% of cases and stationary in 14%.

4. Discussion

During our 2-year study, 1920 children were seen in neuropediatric consultations, of whom 57 had abnormal movements, a frequency of 2.96%.

The age range of 6 months to 5 years was the most affected, *i.e.* 54.4% of cases with an average age of 7.6 years. This average age is close to that of Benrhouma [5] who found an average age of 8.5 years. We noted 15.8% of cases in the 10 -

15 age group, but H. Gouled [6] did not record any cases in this age group.

Boys were more numerous in our study as well as in that of H. Gouled [6] while in Benrhouma's study [5] both sexes were equally affected.

Abnormal movement was the most frequent reason for consultation and concerned 45.7% of our sample. This corroborates the study by A. Roubertie *et al.* *[7]* who found the same reason for consultation despite the fact that these movements are sometimes difficult to analyse [8]. Apyretic convulsions were the second most common reason for consultation in our study and show the diagnostic difficulty linked to the lack of knowledge of this condition both by the nursing staff and by the population.

Types of abnormal movements:

Chorea: this represented the majority of our sample, *i.e.* 31.6% of cases. This result is close to that of H. Gouled [6] who obtained 20% of chorea cases in his study. It is higher than those of F. Alvarez [9] and Benrhouma [5] who respectively found 5% and 11.7%. With a negative family history in all cases of chorea, this would be in favour of Sydenham's chorea probably due to a streptococcal infection, which is common and frequent in the African context and rare in developed countries where streptococcal infections are systematically treated with penicillin [1] [10].

Dystonia: Dystonia is an abnormal movement defined as a tonic, involuntary and sustained muscle contraction resulting in repetitive twisting movements or abnormal postures [11]. They correspond to a wide variety of clinical situations [11] [12]. We counted 26.3% of cases of dystonia in our study, which is close to the result of F. Alvarez [9] who obtained 24% in his series. Our result differs from those of Benrhouma [5] and H Gouled [6] who obtained respectively 38.2% and 40% in their studies. The date of onset of the neurological signs in relation to the infectious disease leads us to believe that these symptoms are secondary to acute necrosis of the basal ganglia, as for example during post-infectious encephalitis [13].

Myoclonus: is characterised by brief, involuntary contractions of a muscle, several muscles or a few muscle fascicles. They can be of cortical or subcortical origin. They affected 17.5% of our sample. This result is higher than the 2% obtained by F. Alvarez [9] and lower than the 32.3% of Benrhouma [5] in their respective studies.

Tremors: These were found in 10.5% of our patients. They were either essential tremor or tremor of action and/or attitude [14]. This result differs from those of H. Gouled [6], F. Alvarez [9] and Benrhouma [5] who found respectively 3.3%, 19% and 17.2% in their studies.

Tics: are involuntary, abrupt, stereotyped and iterative movements, producing a caricature of certain mimicry or gestural activities. They concerned 3.5% of our series, a result almost similar to that of the series of H. Gouled [6] with 3.3%, whereas they predominate in the study of Fernandez A [9] with 39% of cases. Benrhouma [5] reported no cases of tic in his series. Only one case in our study was familial and concerned the father.

Athetosis: These are slow, apparently irregular, small amplitude, incessant reptatory movements. It was found in 8.8% of our series and was sometimes associated with chorea.

ETIOLOGIES:

The main aetiologies found in our study are infectious and represented mainly by encephalitis and meningoencephalitis, followed by severe neurological malaria and meningitis. These would act through an inflammatory process as described in the literature [15]. They represented 78.91% of our sample which is not far from the 70% found by Benrhouma in his study [5].

Complementary examinations

The results of the electroencephalogram were abnormal in 42.10% of our children, whereas H Gouled had 50% of abnormalities. The most frequent abnormality was a significant slowing of the tracing, indicating cerebral distress (43.4%), with an infectious etiology generally incriminated. The frequency of the EEG anomaly observed in his sample of 40 cases of infectious chorea (Sydenham's) allowed M. de Morsier to correlate the severity of the disease with encephalic damage associated with that of the basal ganglia [9]. This study has a great resemblance with ours and that of H Gouled, *i.e.* 14% and 26.7%.

5. Conclusion

Abnormal movements are rare in paediatric practice. They have multiple causes and their management is urgent in certain situations that can jeopardize the future of children.

Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

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Dencing Sheet

Date____ /____ /____.

Number of rounds_____

Section A: Socio-demographic data

Patient's name: _____ Patient's age:. _____

Patient's address:. _____

Telephone number: _____

S/N	Questions	Categories	
001	Gender of the patient:	Feminin: ____1	Masculin: ____2
002	Patient's ethnicity:	Bambara: _____1; Sarakolé: _____3; Malinké: _____5;	Peulh: _____2 Sonrhaï: _____4 Others: _____6

Section B: Patient history

S/N°	Questions	Categories
101	Medical history	No: _____1; Yes: _____2 Specify_____
102	Surgical history	No: _____1; Yes: _____2 Specify_____
103	Family history	No: _____1; Yes: _____2 Specify_____
104	Notion of Medical treatment.	No: _____1; Yes: _____2 Specify_____
105	Notion of exposure to toxic products	No: _____1; Yes: _____2 Specify_____
106	Concept of head trauma.	No: _____1; Yes: _____2
107	Neonatal history.	No: _____1; Yes: _____2 Convulsion: _____1; Infection: _____2; Icterus: _____3 Prematurity: _____4; Others _____5
108	EPI vaccination	No: _____1; Yes: _____2
109	DPM	Normal: _____1; Abnormal: _____2

Section C: Clinical examination of the patient

Weight: _____ (kg); Height: _____ (cm); BP: _____mmhg

T°: _____ (degree celcius)

Reason for consultation_____

Type of abnormal movements:

Tremor_____1; Chorea_____2; Dystonia_____3; Myoclonus_____4; Asterisis_____5; Tics_____6; Ballism_____7; Other_____8

Starting age_____

Installation mode: _____
Topography of the Initial Ditch: _____
Other associated neurological deficits_____
Summary of the neurological examination _____

Section C: Bacteriology/Parasitology

S/N°	Tests	Results
201	ECB and CSF Chemistry	Normal: ____1; Abnormal: ____2; Undetermined: ___3
202	Thick drop	Positive: ____1;Negative: ____2; Undetermined: ____3
203	HIV Serology	Positive: ____1; Negative: ____2; Indetermined: ____3
204	Blood culture	Sterile: ____1; pathology: ____2; Indetermined: ____3
205	Ionogram	Normal: ____1; Abnormal: ____2; Indetermined: ____3
206	Other	Normal: _____1; Abnormal: _____2; Specify_____

Section D: Haematology

S /N°	Investigation	Results
300	haemoglobin	Value: _____g/dl;
301	lymphocytes	Value: _____
302	Other (specify)	Value: _____

Section E: Chemistry

S/N°	Investigation	Results
400	blood glucose	Value: _____
401	creatinemia	Value: _____
402	transaminases	ASAT_____/ALAT_____
403	urea	Value _____
404	Others	Value _____

Section F: Imaging

S/N°	Investigations	Results
500	EEG	Normal_____1; Abnormal_____2; if abnormal result_____
501	Scanner	Normal: _____1 Abnormal_____2; if abnormal result_____

Section G: Etiology: _____

Section H: Treatments

Neuroleptic (1 = yes; 2 = no); Benzodiazepine (1 = yes; 2 = no)
Anti-Comitio (1 = yes; 2 = no); Antidepressant (1 = yes; 2 = no)
Antibiotic therapy (1 = yes; 2 = no); corticosteroid therapy (1 = yes; 2 = no)