Neuroimaging Findings In Algerian Patients With Late Epilepsy

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Abstract:
Background: Late-onset epilepsies are always suspicious and often pose the problem of their etiology. It is an epileptic disease whose first epileptic seizure begins from the age of 25 years. The objective of our study was to determine neuroimaging findings in Algerian patients with late epilepsy.
Materials and Methods: The study population includes all Algerian patients whose age of onset of the first seizure is 25 years or more, recruited during the period from January 2008 to December 2016 at ALI AIT IDIR Hospital in Algiers.
Results: 336 patients with late epilepsy seen between 2008 and 2016. Neuroimaging (CT, MRI, angiography) is pathological in 59% of cases. The distribution by age groups shows that pathological brain imaging was predominant for all age groups except for the group of patients aged (25-29 years) where normal brain imaging was predominant. We find that ischemic stroke was the most observed aspect 25%, with another main aspect being brain tumors 22%. The results of cerebral imaging according to age show a predominance of ischemic stroke for the age groups (60-64 years, 65-69 years, 70-74 years, 75-79 years, 80 years and over). On the other hand, the tumoral pathology was predominant in the group of subjects (25-29 years old) and (35-39 years old). Analysis of brain imaging results of other pathologies confirms the predominance of inflammatory pathology 22 cases including 15 cases with multiple sclerosis imaging, followed by arteriovenous malformations 19 cases. In the brain imaging results we found that multiple sclerosis was predominant in the age group (30-34 years, 50-54 years). On the other hand, arteriovenous malformations were predominant for the age group (25-29 years).
Conclusion: Brain imaging was pathological in 59% of patients. Ischemic strokes were the most observed aspect 25%, with the other main aspect being brain tumors 22%, brain arteriovenous malformations 9.6%, inflammatory pathology 11.2% including multiple sclerosis 7.6%, infectious pathology 7.1%, head trauma 4%, cerebral hemorrhage 4%, hemorrhagic stroke 1.5%. Predominance of ischemic stroke for subjects aged 60 and over. Tumor pathology was predominant in the group of subjects aged (25-29 years) and (35-39 years).
Keywords: Neuroimaging findings, Ischemic stroke, Brain tumors, Brain arteriovenous malformations

I.   Introduction

The diagnosis of late onset epilepsy always requires an etiological investigation in search of a specific cause, especially serious causes such as cerebral expansive processes, even if these do not represent more than 5% of etiologies.

In a context of fever, meningeal syndrome, abnormalities of the neurological examination, intense headaches, it is indicated to perform a cerebral computed tomography, especially if there are elements in favor of a neurosurgical or vascular emergency (hematoma, subarachnoid hemorrhage, subdural hematoma, cerebral abscess). But a normal computed tomography should in no case dispense with the deferred MRI.

The current recommendations of the International League for the Fight against Epilepsy (ILAE, 1997) and (Pohlmann-Eden. B, 1998 [7]; 2008 [5], as well as William D.G, 2011 [6]), have shown that cerebral MRI was more sensitive in revealing smaller lesions than cerebral CT, and will gradually take the place of CT over the next few years**.**

In practice, MRI is most often deferred after performing a brain scan except in the case of suspicion of cerebral venous thrombosis where this examination can be performed immediately. MRI will most often make it possible to complete the analysis of lesions detected on the CT scan or will improve diagnostic performance in the characterization of brain lesions when the CT scan is normal or not very contributive. In addition, apart from this first seizure context, when the seizure represents the onset of epilepsy (inaugural seizure), MRI is the examination of choice for the detection of progressive lesions (ischemic or malformative vascular pathology, tumoral or infectious pathology) and for visualization of epileptogenic lesions (glial scars, focal lesions of malformative or low-grade tumor origin). Epilepsies will thus be classified as cryptogenic epilepsy (lesional but whose lesion is not visible) or symptomatic (identified lesion).

In case of suspected stroke, the MRI performed in an emergency will include classic sequences in TI and in TI or FLAIR as well as sequences of diffusion (positive diagnosis) and perfusion (evaluation of the ischemic penumbra). She will also benefit from an angio-MRI sequence (ARM) to explore the intracranial vessels.

Hemorrhagic lesions will benefit from a gradient echo sequence (GE) in search of multiple bleeding as well as a volume acquisition in Tl after injection or a dynamic ARM with subtraction (ARM-DSA) to search for an underlying vascular malformation.

In case of suspicion of venous thrombosis, the classic sequences will be supplemented by sequences intended for the study of slow flows and in particular of the intracranial venous sinuses (venous ARM).

If it is a tumoral lesion, the classic protocols are carried out: imaging without and with injection in the three spatial planes, supplemented by TI or FLAIR imaging.

Additional sequences will be performed only in special cases and depending on the first results, (diffusion in the differential diagnosis of abscesses when the lesion looks cystic; 3D volume imaging and neuronavigation tracking for surgical intervention or a biopsy sample). The injection of contrast product is essential in the assessment of infectious or tumoral lesions.

Digital cerebral angiography, still considered the reference examination in the exploration of intracranial vessels, has for some years been gradually replaced by new non-invasive imaging techniques (CT angiography and magnetic resonance angio-imaging (MRI) of more and more reliable and sensitive. Conventional angiography retains some indications: particularly in the context of the diagnostic work-up of cerebral angiitis, and especially in the pre-therapeutic work-up and the follow-up of cerebral vascular malformations (arteriovenous malformations and arteriovenous fistulas), and intracranial aneurysms. The place of cerebral angiography in the context of the diagnostic exploration of intracranial vascular pathology has declined in recent years to the detriment of non-invasive techniques such as CT angiography and angio-MRI, some indications still deserve to be explored by conventional angiography.

II. Material And Methods

The study population includes all Algerian patients whose age of onset of the first seizure is 25 years or more, recruited at ALI AIT IDIR Hospital in Algiers.

Inclusion criteria:
1. The age of the patients must be greater than or equal to 25 years at the time of inclus.
2. Patient presenting with his first epileptic seizure at the age of 25 years or older.
3. Clinically and electrically confirmed diagnosis of epilepsy.

Exclusion criteria:
1. Age less than 25 years

III. Results

Our study population includes 336 patients, recruited during the period from January 2008 to December 2016. This figure corresponds to the number of patients selected according to the inclusion criteria.

Neuroimaging findings (CT, MRI, angiography):
Table 1. Distribution of patients according to neuroimaging results

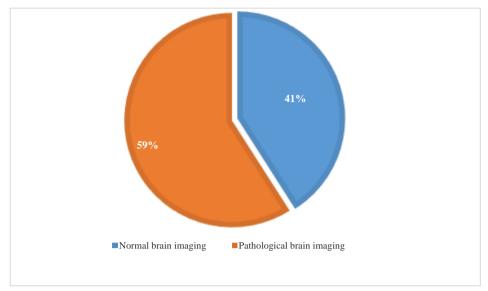|	Cases	%
Normal brain imaging	139	41
Pathological brain imaging	197	59
Total	**336**	**100**

Figure 1. Neuroimaging in the study population

Neuroimaging (CT, MRI, angiography) is pathological in 59% of cases. This situation confirms the predominance of symptomatic epilepsy.

Table 2 . Distribution of patients according to neuroimaging results by age group

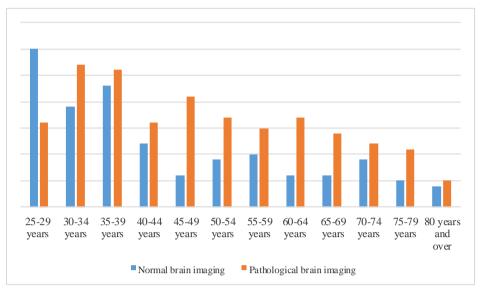|	Normal brain imaging	Pathological brain imaging	Total
25-29 years	30	16	46
30-34 years	19	27	46
35-39 years	23	26	49
40-44 years	12	16	28
45-49 years	6	21	27
50-54 years	9	17	26
55-59 years	10	15	25
60-64 years	6	17	23
65-69 years	6	14	20
70-74 years	9	12	21
75-79 years	5	11	16
80 years and over	4	5	9
Total	**139**	**197**	**336**

Figure 2. Distribution of patients according to neuroimaging results according to age groups

The distribution by age groups shows that pathological brain imaging was predominant for all age groups except for the group of patients aged (25-29 years) where normal brain imaging was predominant.

Table 3. Pathological brain imaging in the study population

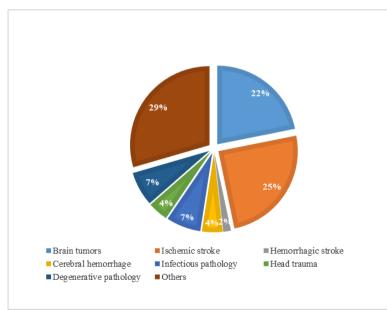|	Cases	%
Pathological brain tumors	197	58,6
Brain tumors	43	12,8
Ischemic stroke	49	14,6
Hemorrhagic stroke	3	0,9
Cerebral hemorrhage	8	2,4
Infectious pathology	14	4,1
Head trauma	8	2,4
Degenerative pathology	14	4,1
Others	58	17,3
Total	**336**	**100**

Figure 3. Pathological brain imaging in the study population

If we take into account the results of pathological brain imaging, we find that ischemic stroke was the most observed aspect 25%, with another main aspect being brain tumors 22%.

Table 4. Pathological brain imaging by age group

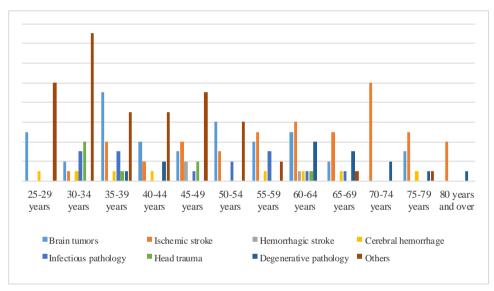|	Brain tumors	Ischemic stroke	Hemorrhagic stroke	Cerebral hemorrhage	Infectious pathology	Head trauma	Degenerative pathology	Others
25-29 years	5	0	0	1	0	0	0	10
30-34 years	2	1	0	1	3	4	0	15
35-39 years	9	4	0	1	3	1	1	7
40-44 years	4	2	0	1	0	0	2	7
45-49 years	3	4	2	0	1	2	0	9
50-54 years	6	3	0	0	2	0	0	6
55-59 years	4	5	0	1	3	0	0	2
60-64 years	5	6	1	1	1	1	4	0
65-69 years	2	5	0	1	1	0	3	1
70-74 years	0	10	0	0	0	0	2	0
75-79 years	3	5	0	1	0	0	1	1
80 years and over	0	4	0	0	0	0	1	0
Total	**43**	**49**	**3**	**8**	**14**	**8**	**14**	**58**

Figure 4. Pathological brain imaging according to age groups

The results of brain imaging according to age show a predominance of ischemic stroke for the age groups (60-64 years, 65-69 years, 70-74 years, 75-79 years, 80 years and over). On the other hand, the tumoral pathology was predominant in the group of subjects (25-29 years old) and (35-39 years old).

Table 5. Other pathologies on brain imaging in the study population

		Cases	%
Other cerebral pathologies		58	17,2
Inflammatory			
	Multiple sclerosis	15	4,5
	Neuro-Behçet's disease	5	1,5
	Neurolupus	1	0,3
	Mixed connective tissue disease	1	0,3
Brain arteriovenous malformations		19	5,6
Basal ganglia calcification		1	0,3
Mesial temporal sclerosis		5	1,5
Cerebral venous thrombosis		7	2
Arachnoid cyst		2	0,6
Chronic hydrocephalus		2	0,6
Total		**336**	**100**

Analysis of brain imaging results of other pathologies confirms the predominance of inflammatory pathology (22 cases) including 15 cases with multiple sclerosis imaging, followed by arteriovenous malformations (19 cases).
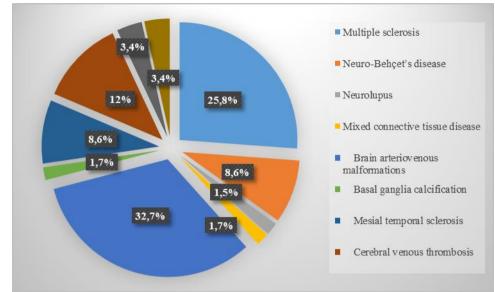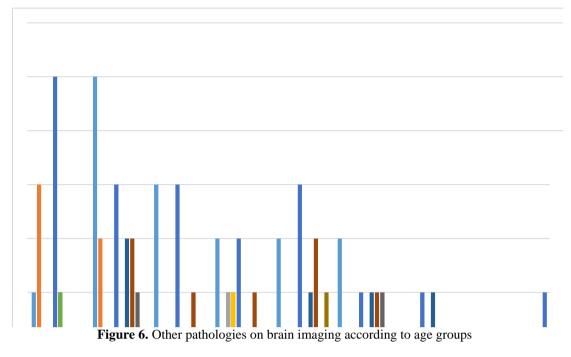

Figure 5. Other pathologies on brain imaging in the study population

Table 6. Other pathologies on brain imaging by age group

	Inflammatory				Brain arteriovenous malformation	Basal ganglia calcification	Mesial temporal sclerosis	Cerebral venous thrombosis	Arachnoid cyst	Chronic hydrocephalus
	Multiple sclerosis	Neuro-Behçet's disease	Neurolupus	Mixed connective tissue disease						
25-29 years	1	3	0	0	5	1	0	0	0	0
30-34 years	5	2	0	0	3	0	2	2	1	0
35-39 years	3	0	0	0	3	0	0	1	0	0
40-44 years	2	0	1	1	2	0	0	1	0	0
45-49 years	2	0	0	0	3	0	1	2	0	1
50-54 years	2	0	0	0	1	0	1	1	1	0
55-59 years	0	0	0	0	1	0	1	0	0	0
60-64 years	0	0	0	0	0	0	0	0	0	0
65-69 years	0	0	0	0	1	0	0	0	0	0
70-74 years	0	0	0	0	0	0	0	0	0	0
75-79 years	0	0	0	0	0	0	0	0	0	1
80 years and over	0	0	0	0	0	0	0	0	0	0
Total	15	5	1	1	19	1	5	7	2	2

In the brain imaging results we found that multiple sclerosis was predominant in the age group (30-34 years, 50-54 years). On the other hand, arteriovenous malformations were predominant for the age group (25-29 years).

Figure 6. Other pathologies on brain imaging according to age groups

IV. Discussion

Brain imaging (CT, MRI, cerebral angiography) is pathological in 197 patients (59%). Ischemic s were the most observed aspect (N=49; 25%), with the other main aspect being brain tumors (N=43; arteriovenous malformations (N=19; 9.6%), inflammatory disease (N=22; 11.2%) including multiple sc (N=15; 7.6%), infectious disease (N=14; 7.1%), degenerative disease (N=14; 7.1%), head trauma (N =ℰ cerebral hemorrhage (N=8; 4%), hemorrhagic stroke (N=3; 1.5%).

Our results are in agreement with data from the literature (Lars Forsgren, 1990 [1]); 1996 [2] Forsgren, 1990 [1], showed that cerebrovascular pathology was the most frequent 21%. Brain tumor found in 11% of cases and head trauma in 7% of cases. In the work of Lars Forsgren, 1996 [2], ischemic was the most frequent radiological aspect 30%, CNS tumors 11%, degenerative pathology (Alzheimer) 7%

However, other studies in the literature find other rates. This could be explained by the accumula risk factors: infectious pathologies (neurocysticercosis), head trauma (traffic accidents), cardiovascul... factors (cerebrovascular pathology). Marcelo Rigatti et al, 1999 [3] found neurocysticercosis in 20% of cases, head trauma in 15% of cases. Andre Oun et al, 2003 [4] had observed head trauma in 13% of cases, vascular pathology in 6.6% of cases (ischemic stroke 4.5%, hemorrhagic stroke 2%).

V. Conclusion

Our study population includes 336 patients, recruited during the period from January 2008 to December 2016. These patients were selected according to the inclusion criteria.

During the study period, 336 cases of late epilepsy were diagnosed, representing a proportion of late epilepsy of 34% compared to all epilepsies.

Radiologically, brain imaging was pathological in 59% of patients. Ischemic strokes were the most observed aspect 25%, with the other main aspect being brain tumors 22%, arteriovenous malformations 9.6%, inflammatory pathology 11.2% including multiple sclerosis 7.6%, infectious pathology 7.1%, head trauma 4%, cerebral hemorrhage 4%, hemorrhagic stroke 1.5%.

The results of brain imaging according to age show a predominance of ischemic stroke for subjects aged 60 and over. On the other hand, tumor pathology was predominant in the group of subjects aged (25-29 years) and (35-39 years).

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