

Brain abscess in Iraq during a 10 years period: Part 1. Epidemiology, aetiology and clinical picture

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Summary:

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Background: This study comprises two parts. "[his part deals with epidemiology, aetiology and clinical features of brain abscess during a 10 years period, while the second will deal with diagnostic investigation, management and final outcome of brain abscess

Methods: The case records of patients with brain abscess admitted to the neurosurgical specialties hospital in Baghdad over a 10 years period extending from 1st Jan. 1993 to 31st Dec. 2002, inclusive were reviewed. Data obtained included demographic and clinical data.

Results: A total of 78 cases (1.2% of total admission) of brain abscess were admitted. Their age ranged from one month to 68 years. The most common¹ aetiological (actor was cyanotic heart disease, with the congenital anomaly being unrepaired in all cases. Remote infection foci other than heart represent minority. Half of the cases had a rapid onset and fluminant progression. The presenting features of the patients older than one year were raised intracranial pressure, and focal neurological deficit and infection.

Conclusion: Maintaining a high index of clinical suspicions in patients having one of the infection sources together with neurological signs should be emphasized. '.

Introduction:

Brain abscess remains a serious disease that leads to mortality and disability if misdiagnosed or managed improperly, and even successfully treated cases of brain abscess can result in long term neurological sequelae and disability ^{1,3}. Its epidemiology has changed little over the last 20 year, with increased incidence among immuno-compromised individuals (transplant recipients, cytotoxic chemotherapy receivers and AIDS patients) and decreased incidence among patients with otitis media and sinusitis, related to earlier diagnosis and more effective antibiotic therapy ⁴.

This study comprises two parts, the first part deals with epidemiology, aetiology and clinical picture of brain abscess while the second part is going to deal with diagnostic investigations, management and final outcome of the brain abscess during a 10 years period extending from 1993 to 2002.

Materials and methods:

This study included review of case records of patients with brain abscess admitted to the neurosurgical department of surgical specialties hospital in Baghdad over a 10 years period extending from 1st Jan. 1993 to 31 Dec. 2002, inclusive. The cases included in the study were those having a clinical picture suggestive of brain abscess supported

by CT scanning appearance. They were 78 cases. In 70 cases of them, the diagnosis was confirmed either by surgical evidence with or without microbiological evidence or by clinical and radiological response to the treatment. The other eight cases were regarded as suspicious since no surgical or microbiological proof of diagnosis or response to treatment (clinical and radiological) was feasible.

Data obtained from the case records included patient age, gender, date of admission, aetiology, sign and symptoms, duration of symptoms before seeking medical advice and onset and progression of disease process.

Other data regarding diagnostic investigations used, management line, recurrences and final outcome were also collected. Data were, also, obtained from neurosurgical department registry book, which included total number of cases admitted to the department during the study period.

Results:

Epidemiology:

A total of 78 cases of brain abscess were admitted to the hospital during the study period, which contribute to an admission rate of eight cases per year. They constituted 1.2% of total admissions. Their age ranged between one month and 68 years with a median age of 10.5 years. The highest incidence of cases was in the age group 1 - 19 years (53.8%) while the lowest incidence fell in the age group 40 years and more. The infantile age group (< 1 year of age) constituted 15.4% of the total study sample (Table 1). The male to female ratio was 1.7:1. The male predominance was demonstrated in all age groups and

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was increasing with increasing age of patients from 1.4:1 in the infantile age group to 9.1:1 in those more than 39 years of age.

Table 1 Age distribution of the cases of brain abscess by aetiology

Aetiology	Total No.	Age group (years)			
		<1	1-19	20-39	≥40
		No. (%)	No. (%)	No. (%)	No. (%)
Metastasis	28	1 (3.6)	22 (78.6)	2 (7.1)	3 (10.7)
Contiguous	19	0 (0.0)	7 (36.8)	9 (47.4)	3 (15.8)
Meningitis	8	7 (87.5)	1 (12.5)	0 (0.0)	0 (0.0)
Trauma	6	2 (33.3)	3 (50.0)	1 (16.7)	0 (0.0)
Immunocompromization	2	0 (0.0)	0 (0.0)	1 (50.0)	1 (50.0)
Infected cyst	2	0 (0.0)	2 (100.0)	0 (0.0)	0 (0.0)
Unidentified	13	2 (15.4)	7 (53.8)	1 (7.7)	3 (23.1)
Total	78	12 (15.4)	42 (53.8)	14 (18.0)	10 (12.8)

Aetiology:

Distribution of the cases of brain abscess according to aetiology is shown in Table 2. The congenital heart anomaly in all cases was not repaired. All patients with otitis media had a unilaterally discharging ear and only 25% of them had undergone mastoidectomy before developing brain abscess.

Regarding age distribution of various aetiological factors, metastasis from a remote infection site was most commonly encountered in the age group 1 - 19 years (78.6%). Contiguous infection was mostly encountered in the age group 30 - 39 years (47.4%). The majority (87.9%) of postmeningitis cases were in the infantile age group. Trauma was encountered in 50% of those 1 - 19 years of age. Two cases were associated with immunocompromization and both occurred in those 20 years and more and 2 cases of infected cysts were reported in those 1-19 years of age. Cases with unidentified aetiology were mostly (53.8%) reported in 1 - 19 years age group (Table 1).

Clinical picture:

Half of the cases had a rapid onset and fulminant progression and the other half had slow onset and insidious progression. In 30.8% of cases the duration of symptoms before seeking medical advice was less than 2 weeks whereas in the remaining 69.2% the duration was equal or more than 2 weeks.

Table 2 Distribution of the study sample by aetiology

Cause	No.	%
Metastasis from a remote infection site	28	35.9
Metastasis from cyanotic congenital heart disease	20	25.6
Metastasis from a remote site other than heart	8	10.3
Contiguous infection	19	24.4
Otitis media	17	21.8
Sinusitis	2	2.6
Meningitis	8	10.3
Trauma to the skull introducing infection	6	7.7
Penetrating trauma	4	5.1
Blunt trauma	2	2.6
Immunocompromization	2	2.6
Infected cyst (hydatid cyst or congenital)	2	2.6
Unidentified	13	16.7
Total	78	100

The presenting features of patients older than one year of age are shown in Table 3. They are divided into features of raised intracranial pressure (ICP), features of focal neurological deficit (FND) and features of infection according to Loftus et al. The three most common features were headache (83.3%), nausea and vomiting (69.7%) and fever (69.7%). Headache was not necessarily at the side of the lesion; it was mostly described as being bilateral or generalized, severe and not responding to analgesics. In 72.7% of cases presented with headache it was associated with vomiting.

Nausea and vomiting were occurring in the morning, forceful in nature and associated with headache in 87% of cases presented with nausea and vomiting. Both headache and nausea and vomiting were encountered together in 60.6% of cases. Fever was reported in 87.5% of cases with duration of symptoms less than 2 weeks and in 46.3% of those with duration of more than 2 weeks. It was, also, more frequently a presenting feature in abscesses of infectious aetiology (in 59.6% of cases) than abscess of traumatic or immunocompromization aetiology. Fever was also encountered in 69.6% of abscess of unidentified aetiology.

Fits were mostly generalized in type and were associated with disturbed consciousness in 66.6% of cases. They were reported with all sites of affection on CT scan but mostly in cases of parietal lobe abscess (in 53.3%).

Hemiparesis was the most common presenting feature of FND occurring in 34.8% of cases. It was left-sided in 65.2% of cases and right-sided in the remaining 34.8% being contralateral to the side of the lesions.

Meningism was reported in 13.6% of cases and was associated with fever and headache in 77.8% of cases.

In cases presented with ataxia and nystagmus, the affected site was cerebellum in 83.3% of those cases and brainstem in the remaining 16.7% of them. However, 28.6% of cases with cerebellar abscess did not present with ataxia and nystagmus at all.

The classical triad of brain abscess (headache, fever and FND) as described by Whispelwey and Scheld⁵ was displayed by 23.1% of cases only.

The classical presenting features of the infantile age group (enlarged head circumference, separation of cranial sutures, bulging fontanel and poor feeding, vomiting, irritability and seizures) as described by Loftus et al⁴ was found in all 12 cases of brain abscess in infants. Fever was encountered in 33% of cases.

Table 3 Age distribution of cases older than one year of age by the presenting clinical features

Clinical features	Total	Age groups (years)		
		1 -19	20 - 39	≥ 40
	No. (%)	No. (%)	No. (%)	No. (%)
Features of raised ICP				
Headache	55 (83.3)	35 (83.3)	11 (78.6)	9 (90.0)
Nausea and vomiting	46 (69.7)	30 (71.4)	9 (64.3)	7 (70.0)
Fits	27 (40.9)	18 (42.9)	7 (50.0)	2 (20.0)
Disturbed consciousness	33 (50.0)	17 (40.5)	8 (57.1)	8 (80.0)
Papilloedema	25 (37.9)	13 (31.0)	6 (42.9)	6 (60.0)
Features of FND				
Speech disturbance	6 (9.1)	2 (4.8)	1 (7.1)	3 (30.0)
Hemiparesis	23 (34.8)	14 (33.3)	5 (35.7)	4 (40.0)
Cranial nerve palsy	13 (19.7)	11 (26.2)	1 (7.1)	1 (10.0)
Visual field defect	12 (18.2)	7 (16.7)	3 (21.4)	2 (20.0)
Ataxia and nystagmus	6 (9.1)	2 (4.8)	3 (21.4)	1 (10.0)
Features of infection				
Fever	46 (69.7)	28 (66.7)	9 (64.3)	5 (50.0)
Meningism	9 (13.6)	4 (9.5)	3 (21.4)	2 (20.0)
Total	66	42	14	10

* More than one feature may be encountered in one patient.

Discussion:

Epidemiology

Brain abscess was presenting 1.2% of total admissions to the neurosurgical department of surgical specialties hospital which contributed to an admission rate of 8 cases per year. This rate is close to the literature reports 6,7 which estimated that 4 to 8 cases are seen on active neurosurgical services in the hospitals of developed countries.

This study revealed that 69.2% of the cases were under the age of 20 years. This figure is slightly

higher than that previously reported in a study at the neurosurgical hospital in Baghdad⁸. It agrees with most literatures describing brain abscess as a disease of first of two decades of life⁴. Brain abscess in the infantile age group constituted 15.4% of the total cases; this figure disagrees with textbook statement that brain abscess is extremely rare before the age of two years⁹.

The reported male: female ratio of 1.7: 1 is close to the 2: 1 previously reported in Iraq⁸ and other countries^{7, 10}. Generally male predominance noticed in all age groups in this study again goes with most literatures 11-13.

Aetiology:

This study showed that congenital heart disease, otitis media and metastatic spread from remote infection sites other than heart were the most common aetiological factors. This frequency of causes differs from that previously reported in Iraq⁸, in which, otitis media, cyanotic heart disease and trauma were reported in decreasing order of frequency. The regression of otitis media to the second place in frequency of causation is in agreement with other studies in Iraq⁸ and with western reports^{4,14} which attributed it to earlier diagnosis and use of active antibiotic therapy.

The congenital heart anomaly in all cases of brain abscess was not repaired, although repair would have reduced incidence of brain abscess in this group if it was carried out¹⁵.

All patients with otitis media had a unilaterally discharging ear; this agrees with other studies⁸. The finding that only 25% of the cases had undergone mastoidectomy before developing brain abscess indicates that brain abscess in those patients was mainly attributed to otitis media.

Remote infection foci other than heart represent only a minority (28.6%) of infection sources in the metastatic abscesses. Among them it was estimated that 62.8% had the remote infection focus in the lung (pneumonia, bronchiectasis and tuberculosis). This is consistent with other reports^{6,16,17}

Trauma was the 4th common aetiological factor accounting for 7.7% of cases of brain abscesses; among those previous intracranial surgery was the traumatic cause in 33.3% of them. In a previous study in Iraq⁸, trauma was reported as 3^d most common aetiological factor. This decline was attributed to better prophylactic regimens for clean neurosurgery and differences in place and time between the two studies. This finding disagrees with literature which report that the relative contribution of intracranial surgery to brain abscess has increased due to decline in other precipitating factors¹⁸.

Sinusitis, immunocomprization and infected cyst were the least frequently registered causes. As for sinusitis, it is close to the 2% previously reported in Iraq⁸, but is low when compared with figures in literatures from western countries¹ However, a

recent western literature reported a relative decline in the contribution of sinusitis to brain abscess⁵. Regarding immuno-compromization, the frequency reported in this study is exceptionally low, as there is a reported increase in its frequency all over the world⁴. As for infected cysts which included hydatid cyst of the brain and congenital epidural cyst, no similar cases were reported in the literature.

No cause was identified in about one 6th of cases which is lower than 27% reported by other workers in Iraq⁸. This probably indicates a better diagnostic identification of aetiology. This frequency, however, is still considered high which match most literature reports in this respect 4,14.

The reported age distribution of various aetiological factors in this study agrees with literatures reporting a high incidence of cyanotic congenital heart disease and otitis media in the age group 1 - 19 years^{15,21} and of meningitis in the infantile age group^{4,5}

Clinical picture:

Onset and progression of disease process were reported to be somewhat helpful in distinguishing symptoms of brain abscess from those of brain tumors or other space- occupying lesions, since those of the preceding tend to be of a rapid onset and fulminating progression²².

The duration of symptoms before seeking medical advice in this study was equal or more than 2 weeks in the majority of cases (70%). This disagrees with the finding of another study in Iraq⁸ and in western literature in which the duration was less than 2 weeks in the majority of cases (60%)^{12,22}

Our finding that the three most common presenting features encountered in patients other than one year of age, presented in decreasing order of frequency were headache, nausea and vomiting and fever agrees with the finding of a previous study in Iraq⁵ and other literature^{4,5} though sometimes in those literatures, fever and nausea and vomiting were interchanging places in order of frequency.

Nausea and vomiting were occurring in the morning, forceful in nature and finally associated with headache in most cases; a finding which indicates that this nausea and vomiting being of central origin.

Fever was reported more frequently as a presenting feature in patients with duration of feature less than 2 weeks before seeking medical advice. This finding leads to the suggestion that fever presence can be used as a guide to the duration of disease evolution. Fever was, also, encountered in a high percent of brain abscess of unidentified aetiology, raising suspicions that the cause in most of those abscesses may be a hidden or yet undiagnosed infection.

Fits were reported with all sites of affection, but the largest group was encountered in cases of parietal lobe abscess. Another study in Iraq reported fits were a presenting feature in abscesses of supratentorial

origin exclusively⁸.

Hemiparesis was found to be the most common presenting feature of FND. A finding which agree with other literatures 6,13

Our finding that meningism was encountered in 13.6% of cases is close to the figure previously reported in Iraq⁸. The association of meningism with fever and headache in 77.8% of cases; should give a priority for diagnosis of meningitis. However, this triad was associated with feature of FND in about 70% of cases; a finding should raise the suspicion of diagnosis of brain abscess.

Ataxia and nystagmus were frequently associated with cerebellar abscess.

However, not all cases of cerebellar abscesses were presented with ataxia and nystagmus⁵.

Only 23.3% of cases of brain abscess displayed the classical triad of headache, fever and FND as described by Whispelwey and Sheld⁵, who reported that less than 50% of cases display this, triad.

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