Brain abscesses, local experience in Sohag, epidemiology, and outcome

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Abstract

Background:

In spite of the rapid advances in both diagnostic and therapeutic roles in the field of central nervous system infections, brain abscesses remain a difficult challenge that faces physicians to choose the ideal management route. The abscess is a result of the patient's internal conflict between immunity and the virulence of the organism. This study is to report our local experience in Sohag university hospital regarding the demographic data, etiology, location, radiological data and outcome of our patients.

Patients & method:

A retrospective study includes 16 patients in 4 years; between November 2009 and November 2013, treated in neurosurgery department, blood culture was done for them. They were diagnosed with CT brain with contrast. They were treated either medically or surgically and followed for six months after the initial management.

Results:

Brain abscesses were more common in males with 13 cases, the most common age was the second decade, the most common presentation was fever, headache and depressed level of consciousness, and middle ear diseases were the most common source. Most patients improved after proper management (GOS 1 and 2). One case died due to comorbidities.

Conclusion:

A wise use of the management options leads to the best outcome; it is a disease of young males and debilitated persons. The most crucial prognostic factor is the initial Glasgow coma Scale.

Keywords:

Brain abscess - Central nervous system (CNS) – Computed Tomography (CT) – Glasgow Outcome score (GOS) – Glasgow Coma Scale (GCS) – Magnetic Resonance imaging (MRI).

Introduction:

Brain Abscesses comprise a large health problem worldwide. Its incidence varies from 8% of all intracranial space occupying lesions in developing countries to less than 2% in developed countries [1]. While no accurate data were registered in Egypt, brain abscess is a

disease of developing countries due to widespread of malnutrition and debilitating chronic diseases like diabetes mellitus and chronic renal failure with or without a renal transplant. The clinical presentation varies with every patient [2]. However, fever and disturbed conscious level are the most common presentations [3]. This does not exclude silent abscesses, especially in immunocompromised patients [4].

Advances in diagnostic tools both radiological (CT and MRI) and laboratory (blood culture) added up in both definitive diagnosis and the outcome. They also reduced the morbidity and mortality in recent years [5]. Looking at another aspect of the topic, choosing the way of treatment among medical, surgical aspiration or surgical excision remains a highly debatable issue. This decision is affected by patient's age, general condition, abscess location, and number[6]. While the minimally invasive stereotactic aspiration is indicated in multiple and deeply seated abscesses or abscesses located in an eloquent area like the brain stem, the open surgical excision is saved for large abscesses that cause significant mass effect although they carry the risk of injuring the edematous brain [7].

Our aim in the study is to report both patient demographics and abscess data and its relation to the outcome after 6 months to choose the optimum treatment in each case.

Patients & method:

A retrospective hospital-based study was taken from the medical records in the Neurosurgery department in Sohag University hospital. After full history taking, all 16 patients were examined generally and neurologically. They were diagnosed with contrasted CT brain.

White blood count and erythrocyte sedimentation rate (ESR) were done and blood & urine cultures were withdrawn for all patients as they might help in recognizing the source of

infection. Pus sample in patients who were treated surgically was sent to a laboratory for bacteriological examination. ENT consultation is mandatory to exclude any pathology as chronic ear infections or sinusitis. Complete chest examination was done to exclude lung abscess as a source of infection. Medical treatment was given for small abscesses (less than 1cm diameter) and medically ill patients, while surgical excision was done for resistant abscesses after medical treatment and those who were causing a significant mass effect.

Patients received empirical combination of parenteral antibiotics for 8 weeks (Ampicillin + third generation cephalosporin + metronidazole) followed by oral antibiotic till the abscess remission. Anticonvulsants were taken for 12 weeks and steroids were taken only in patients who had severe brain edema. A follow-up CT brain with contrast was done after 2 weeks, 1month and every month till the abscess disappearance.

Inclusion Criteria:

1. Proved diagnosis with CT or MRI brain.
2. A patient who agree to participate in this study with a written informed consent.

Exclusion criteria:

1. History of epilepsy.
2. Mental retardation.
3. Patients who do not complete the follow-up period.

Results:

In our study, males were predominant (81.3%), while females were (18.7%), the male to female ratio was 4.3 / 1. The age varied from 6 months to 52 years. There were associated diseases in 6 patients (37.5%). Table (1) summarizes the data of our patients.

While headache was described as the initial manifestation in 14 patients (87.5%), fever occurred in 13 patients (81.3%) and disturbed conscious level in 9 patients (56.3%), whereas focal neurological deficit occurred in 4 patients (25%) and convulsions were experienced only in 2 patients (12.5%), table (2). All our patients had single unilocular abscesses with no reported cases of multiple or multilocular abscesses. One patient died 7 days after the diagnosis as he was generally debilitated with ischemic heart disease with initial GCS 7.

The frontal lobe was the most common location by 7 cases (43.7%) followed by temporal lobe with 5 cases (31.3%) and parietal lobe by 4 cases (25%). Most cases were treated with repeated aspiration under the cover of antibiotics (62.5%). The average number for repeated aspiration was 3 times while the medical treatment only was given in 3 patients either due to small abscess volume (<1cm) in one patient or debilitating diseases in two patients.

The primary septic focus was detected only in 9 patients (56%); the most common source in our study was contagious spread from otitis media and sinusitis in 7 patients (43.8%) and the hematogenous spread in one patient (6.2%) and after the elevation of compound depressed fracture in one patient (6.2%) while in 43.8% no recognizable source found. Cultures were positive only in 10 patients (62.5%) and this may be due to previous antibiotic intake before the surgical procedure. Nine patients (56.2%) were discharged with GOS 5 and 6 (37.5%) patients

were discharged with GOS 4 and one case died due to concomitant morbidity (ischemic heart disease) table 2.

Table 1: Demographic data of the patients

Patients	Age	Gender	Comorbidities	Management
1	10 years	M	None	Aspiration +Antibiotic
2	15 years	M	None	Aspiration +Antibiotic
3	26 years	M	None	Excision +Antibiotic
4	17 years	F	None	Aspiration +Antibiotic
5	43 years	M	Chronic chest infection + D.M	Excision +Antibiotic
6	22 years	F	None	Aspiration +Antibiotic
7	47 years	M	CRF	Aspiration +Antibiotic
8	44 years	M	D.M	Excision +Antibiotic
9	9 months	M	Non	Aspiration +Antibiotic
10	52 years	M	IHD	Medical
11	41 years	F	D.M	Medical
12	6 months	M	Non	Aspiration +Antibiotic
13	20 years	M	None	Aspiration +Antibiotic
14	49 years	M	Chronic liver disease	Medical
15	8 months	M	Non	Aspiration +Antibiotic
16	18 years	M	None	Aspiration +Antibiotic

M: male, F: female, CRF: chronic renal failure, DM: diabetes mellitus, IHD: ischemic heart disease

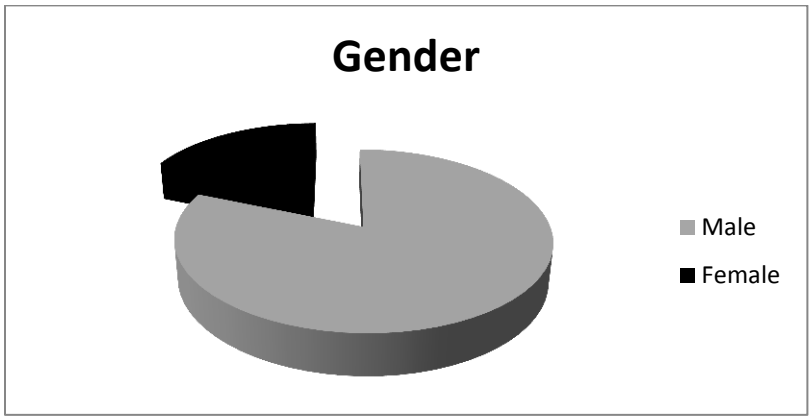


Fig. 1: The gender ratio

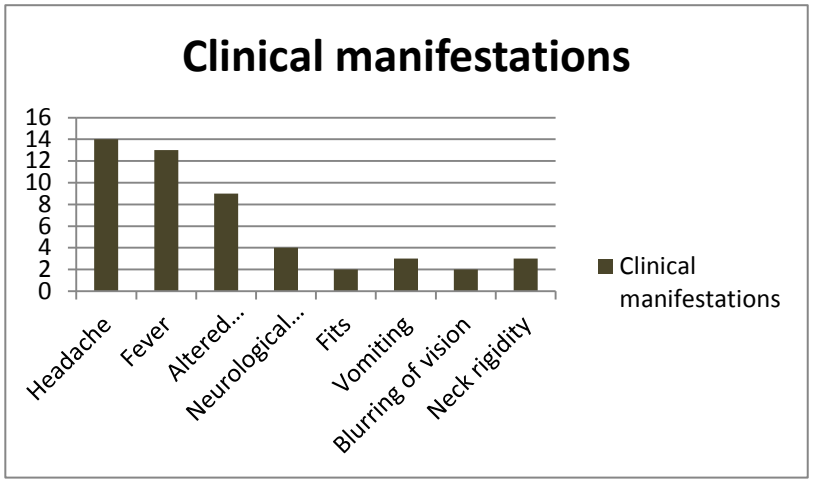


Fig. 2: Clinical manifestation of the patients

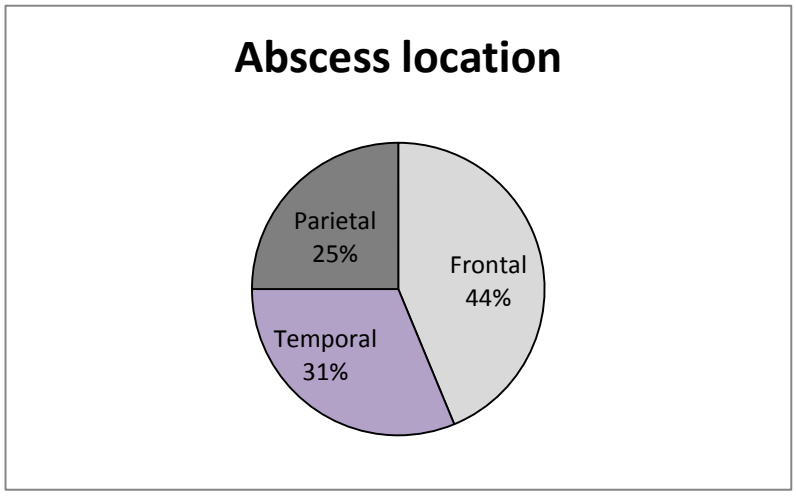


Fig. 3: The brain abscess location

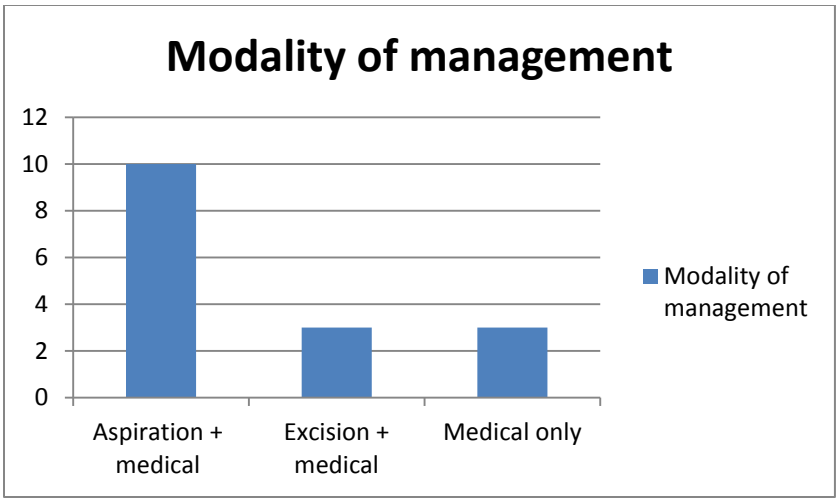


Fig. 4: Different options for management

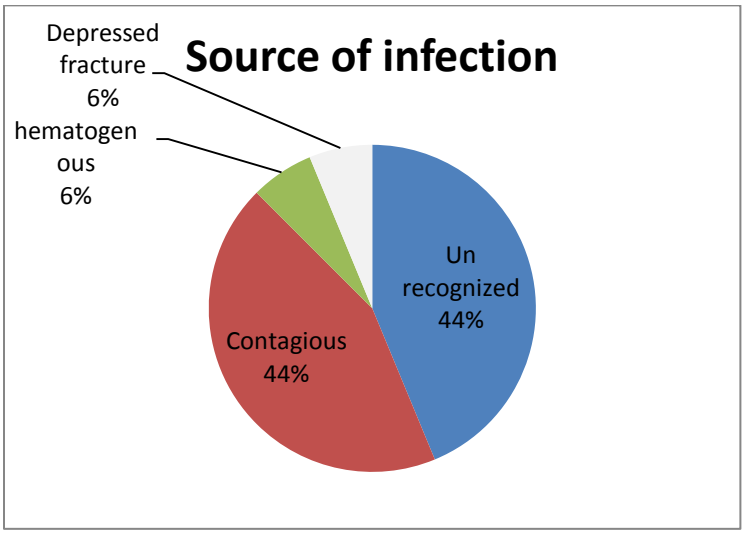
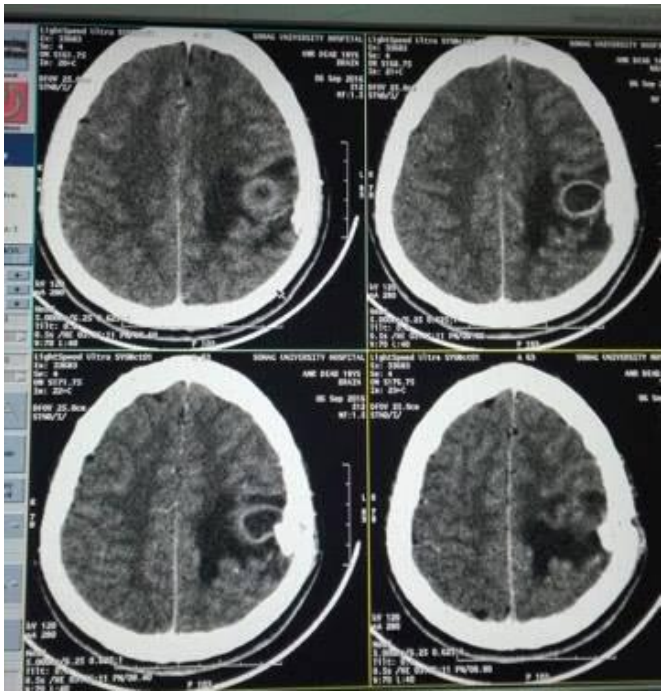
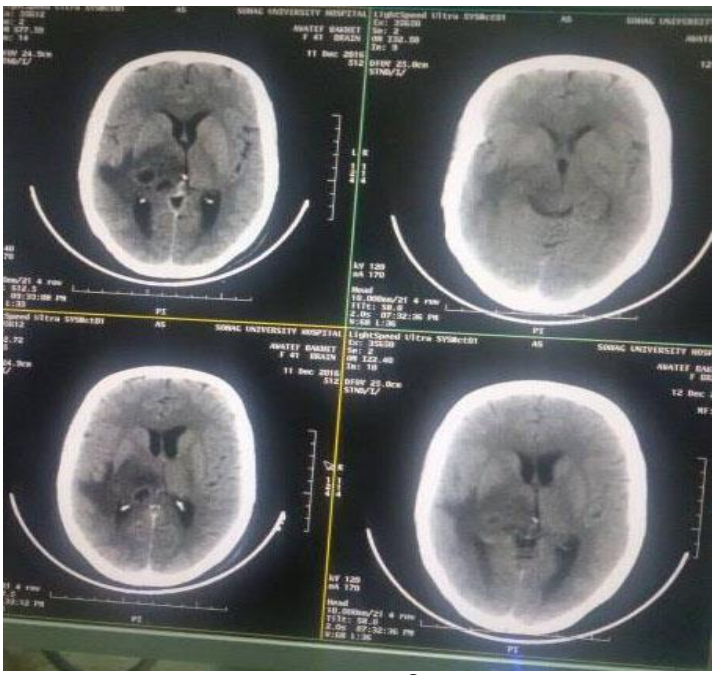


Fig. 5: Primary focus distribution

Case (1): 18 years old male complained of headache, fever and right-sided hemiparesis, repeated aspirations (2 times) under antibiotic cover were done for him and the patient restored his normal motor activity. CT brain shows left parietal abscess



Case (2): 41 years old lady presented with altered conscious level and fever with left sided hemiparesis, CT brain shows right thalamic small abscess which was treated medically only and the patient was discharged fully conscious without neurological deficit.



Case 3: 26 years old male presented with disturbed conscious level and left-sided hemiparesis, CT shows right large parietal abscess. The patient underwent surgical excision under cover of antibiotics and the patient was discharged fully conscious without neurological deficit.

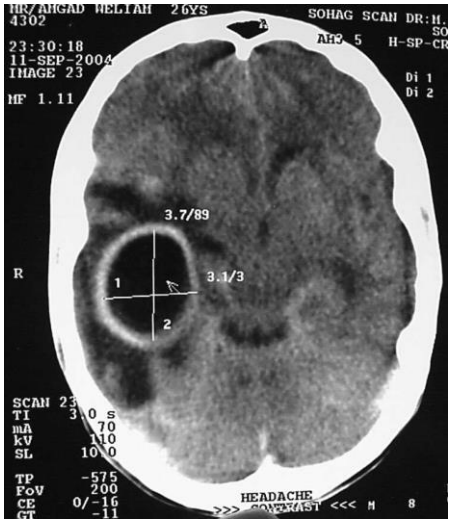


Table (2): Glasgow Outcome Score

Score	Functional outcome	Functional assessment
1	Good recovery	Resumption of normal activities even though there may be minor neurological or psychological deficit
2	Moderate disability	Independent as far as daily life is concerned; disabilities include varying degrees of dysphasia, hemiparesis or ataxia, intellectual and memory deficits, personality changes
3	Severe disability	Conscious but disabled; dependent on others for daily support due to mental or physical disability, or both
4	Persistent vegetative state	Exhibits no obvious cortical function.
5	Death	Death

Discussion:

In our study, brain abscesses were more common in males with a male to female ratio was 4.3 / 1 which is higher than another study [8]. Brain abscess is more common in the second and fifth decades, and we had 9 patients (56.2%) above 15 years, this is similar to results reported in another study [9]. The most common clinical picture was headache and fever, while

headache and vomiting were the most presenting manifestations described by another author [10].

The classic triad of fever, headache and disturbed conscious level in our study occurred only in 4 patients (25%) compared to other studies which showed 17.5% of that clinical triad [11, 12]. The disturbed conscious level occurred in 56% of patients while in other studies they reached up to two-thirds. In our patients, the most common source of infection was the contagious route from the middle ear and paranasal sinuses and this is analogus to other literature [13, 14]. On the other hand, some authors [15, 16] stated that the hematogenous spread is more common especially among debilitated patients. Others reported that, with increased incidence of motor vehicle accidents, the head trauma became the main source of infection [8, 10, 17].

All our patients had a single unilocular abscess which is opposite to other studies which had an incidence of multiple abscesses varying from 10% to 50 % [18]. In our series one case died (6%) which is comparable to other studies 7%, 7.7% [19, 20] and less than many other literatures [21, 22]. In our study, the frontal lobe was the commonest site of abscess followed by temporal lobe which is similar to other studies [23-25].

Regarding the treatment protocol, we recommend that any large abscess (diameter > 2cm) should be treated surgically unless the general condition of the patient can't withstand the general anesthesia [26]. If it is located in an eloquent area, it is better to be treated with stereotactic aspiration [27]. Small abscess (diameter < 1.5 cm) can be managed medically. Medical treatment could be applied also in the early stage of cerebritis [18]. Parenteral third generation cephalosporin, ampicillin, and metronidazole were given and continued for 6 – 8 weeks. This protocol is similar to protocols put in other studies [9].

We observed that initial GCS is the most crucial prognostic factor. The lower the GCS was, the worse the prognosis was expected. Other prognostic factors include the age and the patient comorbidities. Other literatures had involved the number of abscesses as an additional prognostic factor [6]. The lower mortality rate in our study may be due to aggressive treatment from the time of diagnosis and also the majority of our patients were with GCS $\geq$ 14.

The main limitation of our study is the few number of patients which restricts our judgment toward the results and outcome, and we hope to extend this study to add data and conclude wider results.

Conclusion:

Brain abscess is still a serious disease that leads to morbidity and mortality; however, with advances of the new generations of the antibiotics, the mortality has been much reduced. It is common in young males and debilitated persons. The secret of success here is the early diagnosis and tailoring the optimum treatment with each patient. GCS is the most important prognostic factor.

Abscesses with a diameter larger than 2 cm should be treated surgically. Aspiration surgery is the most common used treatment; however, conversion to another way of treatment can occur during the course of treatment. Serial CT scans should be done weekly till complete disappearance of the brain abscess.

Conflict of interests & disclosure:

The author declares that there is no conflict of interest or any financial support during the study

Acknowledgment:

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الملخص العربي

دراسة عن خراج المخ، خصائص المرضى ونتائج العلاج بمستشفى سوهاج الجامعي

مقدمة البحث:

ان مرض خراج المخ يعتبر من الامراض الخطيرة في جميع أنحاء العالم والتي قد تؤدي للوفاة أو لمضاعفات خطيرة، بعض الاختراعات الحديثة مثل الاشعة المقطعية وأشعة الرنين المغناطيسي قد ساعدتنا كثيرا في دقة التشخيص والمتابعة لتلك الحالات. كما أن اكتشاف العديد من المضادات الحيوية الحديثة قد قلل بشكل مباشر في نسبة الوفيات عن نسبتها في العقود السابقة. هذا المرض ينتشر بصورة أكبر في سن الشباب وبين المرضى المصابين بأمراض مزمنة وأصحاب المناعة الضعيفة.

طريقة البحث:

دراسة أجريت على 16 مريضا بمستشفى سوهاج الجامعي خلال اربع سنوات في الفترة ما بين نوفمبر 2009 ونوفمبر 2013. تم تسجيل كل المعلومات الخاصة بالمرضى من العمر والنوع ومكان الخراج وحجمه وطريقة العلاج.

نتائج البحث:

معظم المرضى عانوا من صداع مزمن وارتفاع بدرجة الحرارة وباعتلال بدرجة الوعي وتشنجات متكررة. معظم المرضى كانوا من الذكور في العقد الثاني من العمر. الاغلبية العظمى منهم تحسنوا بشكل كبير وتوفي مريض واحد وذلك لوجود أمراض مصاحبة أدت للوفاة. كان معظم مصدر العدوى من التهابات الاذن الوسطى وكان الفص الامامي هو المكان السائد لوجود هذا المرض.

ملخص البحث:

على الرغم من خطورته فان اختيار الوسيلة المناسبة لعلاج كل مريض على حدة اما بالتدخل الجراحي والدوائي معا او الاكتفاء بالعلاج الدوائي هي كلمة السر في نجاح العلاج. متابعة المريض بشكل اسبوعي عن طريق الاشعة المقطعية مهما لمتابعة المريض حتى اختفاء الخراج بشكل كامل.