Hemispheric brain abscess: A review of 46 cases

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Summary

Background: **Brain abscess is a space occupying lesion that still prevails in many developing countries but less common in developed countries. It can be a preventable cause of fatal illness if diagnosed and treated appropriately. There is little or no information of the condition in Ghana. In this review we report our experience at the Neurosurgical unit of Korle Bu Teaching Hospital (KBTH) over a four year period.**

Study design: **A retrospective study of 46 patients with brain abscess(es) seen between January 1994-December 1998 was carried out at the Neurosurgical unit of KBTH, Accra, Ghana. Using hospital records of 46 patients an evaluation of computerized tomography (CT) scans of brain abscesses and the different methods of surgical treatment were made.**

Results: **33 (72%) were male and 13 (28%) were female. 32 (70%) of the patients were aged 20years or younger. Brain C.T. Scan was the main diagnostic imaging study performed on all the patients. In all but one case the diagnosis was a solitary abscess (98%). 38 patients (83%) had burr hole drainage under sedation and local anaesthesia and 12 under general anaesthesia. All patients were managed with appropriate antibiotics and steroids. There were 5 fatalities.**

Conclusion: **Simple burr hole drainage combined with appropriate medical treatment was found to be satisfactory in managing these patients.**

Key-words: ***Brain abscess, Antibiotics, Corticosteroids, Burr hole drainage, Local anaesthesia, C. T. scan.***

Résumé

Introduction: L'abcès de cerveau est une lésion d'occupation de l'espace qui règne toujours dans beaucoup de pays en voie de développement mais moins commun dans les pays développés. Ce peut être une cause évitable de maladie mortelle si diagnostiqué et traité convenablement. Il y a peu ou pas d'information de la condition au Ghana. Dans cette revue nous rapportons notre expérience à l'unité neurochirurgicale de l'hôpital d'enseignement de Bu de Korle (KBTH) sur une période de quatre ans.

Plan d'etude : Une étude rétrospective de 46 patients présentant l'abscess(es) de cerveau vu entre janvier 1994-December 1998 a été effectuée à l'unité de neurochirurgie de KBTH, Accra, Ghana. En utilisant des disques d'hôpital de 46 patients une évaluation des balayages automatisés de la tomographie (CT) des abcès de cerveau et des différentes méthodes de traitement chirurgical a été faite.

Les résultats : 33 (72%) étaient masculins et 13 (28%) étaient femelles. 32 (70%) des patients étaient 20years ou plus jeunes âgés. Le cerveau C.T.Scan était l'étude diagnostique principale de formation image réalisée sur tous les patients. En tout sauf un cas le diagnostic était un abcès solitaire (98%). 38 patients (83%) ont eu le drainage de trou de bavures sous la sédation et l'anesthésie locale et 12 sous l'anesthésie générale. Tous les patients ont été aussi bien contrôlés avec les antibiotiques et les stéroïdes appropriés.

Conclusion: Le drainage simple de trou de bavures combiné avec le traitement médical approprié est avéré satisfaisant en contrôlant ces patients.

Introduction

Brain abscess used to be a relatively common disease with a poor outcome[1] but with the present use of more appropriate and effective antimicrobials in managing infections from neighboring structures in the head and neck area it is less so especially in developed countries[2, 3,4]. Risks include congenital heart diseases such as Tetralogy of Fallot and congenital blood vessel abnormalities of the lung like Osler-Weber-Rendu disease[5]. In developing countries, cerebral abscess is not a rare occurrence[6]. Advances in antimicrobial therapy, surgical and radiological techniques have played a remarkable role to drastically improve outcome[7]. There is no universal agreement on the mode of surgical management of brain abscess[4, 5, 8]. Complete excision or stereotactic aspiration and drainage, using mainly CT-guided methods, is the primary goal of contemporary surgery for brain abscesses[4, 9]. In this article we report the results of a study of 46 patients who were treated at the Neurosurgical unit of the University of Ghana Medical School at the Korle-Bu Teaching Hospital over a period of 4 years.

Clinical material and method

The case notes, operating room logbook records and CT scan reports of 46 patients were retrieved. The clinical, demographic and radiological data as well as management options were carefully recorded and analyzed using EPI INFO version 6 software. Only patients who had complete records and did require surgery were included. Those who could not be followed up for 6 months or more were excluded.

Result

The male: female ratio was 2.5:1 (table 1). Despite this we found no difference in the clinical course between men and women. The average annual incidence was 4.8% of all admissions to our unit. The most common presentation was hemipareisis followed by impaired consciousness (table 2). Computerized tomography with contrast enhancement was used on all the patients for diagnostic purposes. The CT scans revealed a well-defined rim-enhancing lesion with central hypo-density and peri-lesional oedema in all the cases. The lesion mostly exerted variable mass effect on the adjacent brain and ventricle (Fig. 1). The frontal lobe was the most common location followed by the parietal lobe (Table

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Table 1 Age and sex distribution in 46 patients

	Age (Years)					Total
Sex0 - 10	**11 - 20**	**21 - 30**		**30 and above**	**No.**	**percentage (%)**
Male	9	14	6	4	33	72
Female	3	6	3	1	13	28
Total	12(26%)	20(43%)	9(20%)	5(11%)	46	100

Table 2 Clinical symptoms and signs

	No of cases	Percentage (%)
Fever	10	22
Headache	13	28
Convulsion	7	15
Hemi paresis	17	37
Hemianopia	2	4
Speech disturbances	3	7
Abducens palsy diplopia	2	4
Impaired consciousness	15	33

Table 3 Locations of abscesses

Parietal		**No of cases**	**Percentage (%)**
	Solitary uni-locular	9	20
	Solitary multi-locular	2	4
	Multiple abscesses (>1)	1	2
Frontal	Solitary uni-locular	16	35
	Solitary multi-locular	5	11
	Multiple abscesses (>1)	0	0
Temporal	Solitary uni-locular	7	15
	Solitary multi-locular	2	4
	Multiple abscesses (>1)	0	0
Occipital	Solitary uni-locular	4	9
	Solitary multi-locular	0	0
	Multiple abscesses (>1)	0	0

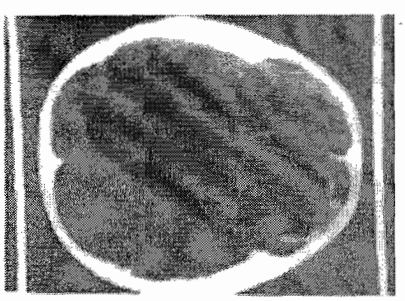

Fig. 1 ***Pre-operative brain abscess***

Fig. 2 ***Immediate post-op***

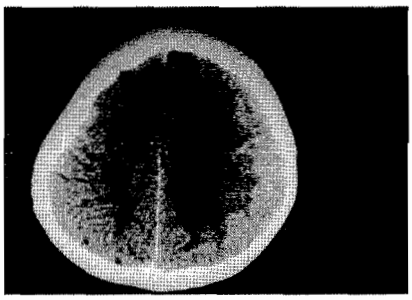

Fig. 3 *Six (6) months post-op.*

3). Only one patient had multiple abscesses. This was hemispherical in the right parietal region. All the other patients had solitary abscesses.

The 9 patients (20%) with solitary multi-locular abscesses and the single case of multiple abscess underwent craniotomy and excision. The 36 patients (78%) with solitary uni-locular abscesses were aspirated and drained under local anaesthesia.

All patients received parenteral antibiotics for 4 to 6 weeks, corticosteroids for 5 to seven days and anticonvulsants pre- and post-operatively.

Information concerning the bacteriology of the brain abscess was not available in most cases. Sixteen of the 46(35%) pus cultures yielded positive bacterial growth. The most common bacteria isolated were *staphylococcus* and *streptococcus* species. Anaerobic cultures could not be done.

Operative mortality was defined as death within 30 days after surgery. There were 5(10.9%) fatalities- 3 of whom had aspiration and drainage and 2 in the craniotomy group. Two patients who had craniotomy had post-operative bleeding and had to be re-operated on. Both survived.

Post-operative CT scans were carried out at 1, 3 and 6 months on all patients who survived. In all cases there was resolution of the abscess and associated mass effect at six months(Fig. 3). At about the same time most of the presenting symptoms had resolved.

Discussion

In developed countries an active neurosurgical service may expect to see 4 to 10 patients each year with a brain abscess and it affects about 1 in 100,000 in the USA[1,5]. Emejulu et al[6] reported 17 cases seen over a four year period (that is an average of 4 cases a year) in Ibadan. In the present study an average of 11 to 12 patients were seen each year which represents twice the incidence in Ibadan.

Majority of brain abscesses usually result from infections of neighboring structures (eg. paranasal sinuses, middle ear, oral and periorbital infections)[2,7,10]. In general paranasal infections spread to the frontal lobe, middle ear infections to temporal or occipital lobe and haematogenous to the parietal lobe. In this study most abscesses resulted from paranasal infections unlike the study in Ibadan which was mainly due to trauma. This is reflected in the finding that most of the abscesses in our study were located in the frontal lobe (table 3). According to Wisepelway et al[11] improved antimicrobial therapy has changed this to a degree, however; such foci still provide the single largest source and account for some 40% of cases. Haematogenous spread from remote primary infections accounts for nearly 30% of cases[11]. Of these, pulmonary infections have traditionally been cited as frequent sources, though dental and oral infections (cavernous sinus thrombophlebitis) are increasingly seen as primary sites[11]. Direct seeding from trauma or neuro-surgical procedures causes 10% of cases. Approximately 20% of cases are considered to be either idiopathic or of undetermined origin[11]. In all of these cases, etiologic organisms are overwhelmingly bacterial. Information concerning the bacteriology of the brain abscess in this study was not fully available. 35% yielded gram-positive aerobic cocci namely, *staphylococcus and streptococcus*. The low positive culture results may be due to the less extensive and fastidious culture techniques, as there was no attempt to grow anaerobes. Another explanation could be due to the initiation of antibiotic therapy several days before the culture samples were taken in most cases. The results from Ibadan isolated gram negative bacillus as the most common causative organism[6]. With the increase in incidence of human acquired immunodeficiency syndrome (AIDS) in our communities the rise in opportunistic infections resulting in brain abscess cannot be ruled out. Such organisms as *Toxoplasma gondii, Narcodia aspergillus* and *Candida* now constitute the common pathogens of brain abscesses in some inner-city Emergency Departments in AIDS-endemic zones[2]. The introduction of C.T.Scan and new antibiotics have dramatically reduced mortality rates for total purulent brain abscesses from 40 to 60%[4,5,8,9] in the pre-C.T. Scan era to the current rates of 0 to 10%[9,12,14]. The mortality rate observed in our series, all of whom were diagnosed with CT-scan, was 10.9%. This mortality rate is similar to the rates reported for solitary or multiple bacterial abscesses elsewhere[13,14,15,16].

Brain abscesses have been treated most commonly by drainage, aspiration, excision, or a combination of these methods. Dandy introduced the technique of abscess aspiration by one or multiple taps through a burr hole, while Clovis Vincent in the 1930's advocated excision via formal craniotomy after encapsulation[11,12]. Reduction of abscess size by tapping or drainage in the acute phase followed by excision of the residual capsule has also strong advocates[14]. The present study shows that 78% of all the brain abscesses were treated by aspiration and drainage via burr hole craniostomy[12]. 36 solitary uni-locular abscesses were treated by aspiration and drainage and 9 solitary multi-locular abscesses and 1 multiple abscess were treated by excision via formal craniotomy in our review. Effective treatment must be coordinated between medical and neurosurgical services[11]. In seriously ill patients, antibiotics directed towards likely pathogens are started without delay, although several series have shown few detrimental effects from withholding antibiotics until abscess sampling in less severely ill patients[15,16] In this study all patients received intravenous

antibiotics pre-operatively and this was continued post-operatively for a total of six weeks.

Conclusion

From our findings we conclude that burr hole trepanation with aspiration and drainage should be the method of choice for the initial treatment of solitary non-locular brain abscess. Early detection and effective treatment of paranasal sinusitis, otitis media and periorbital cellulitis however will drastically reduce the incidence of brain abscess in our environment.

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