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ETIOLOGICAL FACTORS OF BRAIN ABSCESS

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ABSTRACT

Objectives: To find out the etiological factors of brain abscesses in patients admitted in Hayatabad Medical Complex, Peshawar in the year 2009.

Material and Methods: This descriptive study was carried out in the Neurosurgery Units of Hayatabad Medical Complex, Peshawar from January to December 2009. Forty eight consecutive cases with brain abscesses were included in the study. Diagnosis of brain abscess was established in all patients with CT scanning. The patients were evaluated for the predisposing factors.

Results: The study population included 31 males and 17 females. Mean age was 29.2 ± 2.3 years. The predisposing factors for brain abscess were noted in 43 (89.6%) patients while no etiological factor was found in 5 (10.4%). Contiguous focus of infection was found in 18 (37.5%) patients, hematogenous spread in 16(33.3%) and direct inoculation in 9 (18.8%) patients.

Conclusion: Brain abscess is a fatal condition. Every patient with brain abscess should be evaluated for a possible source of infection. Contiguous focus of infection is the commonest etiological factor. However in a few cases, no source of brain abscess can be found. Particular attention should be given to the early recognition of etiological sources and proper prophylactic approach should be adopted to prevent development of brain abscess.

Keywords: Brain abscess, Etiological factors.

INTRODUCTION

A brain abscess is a focal, intracerebral infection that begins as a localized area of cerebritis and develops into a collection of pus surrounded by a well vascularized capsule.[1] Brain abscess is relatively uncommon with an incidence of about 1 in 100,000 persons per year.[2] Most brain abscesses are caused by a focus of infection in a contiguous structure (40-50%). Up to 25% of abscesses are cryptogenic and have no clear source.[3] Brain abscess can arise as a complication of a variety of generalized infections, immunocompromised state, cyanotic heart disease (CHD) e.g. Valvular defect, Fallot's Tetralogy, trauma or surgery. Bacteria can invade the brain by direct-spread or through hematogenous seedling.[4] Cyanotic heart disease accounts for 12.8–69.4% of all cases of brain abscesses with identified risk factors in several series, with the incidence being higher in children.[5] A recent case series found that 37% of brain abscesses were associated with head penetration.[6] Brain abscess is a serious life threatening infection especially in children.[7,8] It has a poor outcome if diagnosed late. Delayed surgical drainage has high morbidity and mortality.[9] Brain abscess is enclosed by a membrane that forms around it and creates a mass.[10]

The symptoms may be sudden or of gradual onset and include headache, vomiting, fits, fever, focal deficits, cranial nerve palsies and in some cases papilloedema.[11]

Computed tomography scan (CT scan) brain (plain and with contrast) is the investigation of choice for the diagnosis. In doubtful cases MRI brain is done. Treatment of brain abscess is medical as well as surgical depending on its stage, location, size and number.[12,13,14,15] Inoperable abscesses can be treated by stereotactic aspiration[16].

In this study the age and sex distribution and etiological factors of brain abscess were studied. These factors may help in early diagnosis of brain abscess. Keeping in mind the possible etiological factors of brain abscess, the physicians may start their patients on proper empirical antibiotics. This may also help in

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eliminating the incidence of brain abscess through appropriate prophylactic approaches and thus reducing morbidity and mortality from different causes of brain abscess.

MATERIAL AND METHODS

Subsequent to approval from the ethical committee of Hayatabad Medical Complex, Peshawar, and obtaining informed consent from patients, 48 patients were included in this descriptive study. The study was carried out in the Neurosurgery Department of Hayatabad Medical Complex, Peshawar from January to December 2009. Patients with confirmed brain abscess on CT brain, irrespective of their age and sex were included for analysis. However those cases were not considered for this study who had a fungal, amoebic or tuberculous brain abscess.

Brain abscess was defined as one or more localized lesions with the following characteristics on brain imaging (CT appearance): Hypodense center with a peripheral uniform ring enhancement following the injection of contrast material, or affected region surrounded by variable hypodense areas of brain edema or nodular enhancement or area of low attenuation without enhancement. Diagnosis of etiological factors was confirmed by reviewing medical records of all patients.

RESULTS

The study population included 31(64.59%) males and 17 females (35.41%) with the mean age of 29.2±2.3 years (age range 3 – 65 years). Twenty-four patients (49.99%) were in the age range of 3-20 years. The following predisposing factors were noted in 43 (89.6%) patients: Contiguous focus of infection (Sinusitis in 9, Mastoiditis in 2, and Chronic suppurative otitis media in 7) was found in 18 (37.5%). Hematogenous spread (Congenital Heart Disease in 11, Bronchiectasis in 2 and Septicemia in 3) was noted in 16(33.3%) patients. Direct inoculation (post traumatic complications in 4, neurosurgical complications in 5) was noted in 9 (18.8%) patients. In 5 cases (10.4%) no etiological factors was found. These results are detailed in Table 1.

Spread of infection from an adjacent infected site was the most common predisposing factor (sinusitis in 10 and chronic otitis media in 8 cases). The most common form of congenital heart disease contributing to brain abscess was Tetralogy of Fallot (8 cases).

Table 1: Etiological Factors

S. No.	Group classification & Etiological Factors	No. of patients & percentage
1.	**Contiguous Focus of Infection**	
	a. CSOM	7(14.5%0
	b. Mastoiditis	2(4.1%)
	c. Sinusitis	9(18.75%)
2.	**Hematogenous Sources**	
	a. ToF	8(16.6%)
	b. VSD	3(6.25%)
	c. Bronchiectasis	2(4.16%)
	d. Septicemia	3(6.25%)
3.	**Direct inoculation**	
	a. Skull Fracture	3(6.25%)
	b. Penetrating Injury	1(2.08%)
	c. Tumour excision	3(6.25%)
	d. V.P Shunting	2(4.16%)
4.	**Cryptogenic**	5(10.4%)

CSOM: Chronic Supporative Otitis Media, CHD: Cyanotic Heart Diseases, TOF: Tetralogy Of Fallot, VSD: Ventricular Septal Defect, V.P: Ventriculoperitoneal Shunt.

DISCUSSION

Cerebral abscess is a deadly intracranial space occupying lesion if not timely treated. In most of the cases predisposing factors are present but in upto 25% of patients no cause can be found.[3] Domingo studied presentation, treatment and outcome of 98 children with brain abscess at Red Cross War Memorial Children's Hospital in Cape Town, in which, middle ear disease and trauma were the commonest sources of infection found in 60% of patients.[17] Contiguous focus of infection is the commonest source, most often in the para nasal sinuses, middle ear and mastoid cells.[3] The most common predisposing factor of brain abscess in our analysis is spread from adjacent sites (37.5%). Seeding of the brain presumably occurs via transit of bacteria through the valveless emissary veins that drain infected regions and permit either direct or retrograde flow into the venous drainage systems of the brain.[7] Similarly there were no predisposing etiological factors in 10.4% cases in the present study which is the same as reported by other workers.[3] CHD is a very common cause of hematogenous spread in children (37%).[9] In our study it is 22.9%. This difference may be due to the number of patients, study design, chance or the inclusion and exclusion criteria. In a retrospective study designed by Fica et al in Santiago on 30 patients admitted for brain abscess, contiguous source of infection was identified in 40% of cases, direct inoculation secondary to trauma or neurosurgery in 23.3%, and a distant source in 23.3%.[18] The overall results of our study are closely comparable to this study. Brain abscess usually affects adults, with

a peak incidence in the second and third decades of life. In our study, most of the patients were males with the highest incidence in the second decade (29.16%) showing a similar pattern.

CONCLUSION

Brain abscess is fatal condition. Every patient with brain abscess should be evaluated for a possible source of infection. Contiguous focus of infection is the commonest etiological factor. However in a few cases, no source of brain abscess can be found. Particular attention should be given to the early recognition of etiological sources and proper prophylactic approach should be adopted to prevent development of brain abscess.

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