Brain Abscess: CT vs Non-CT Evaluation and Management

Azaz Ali Shah,* M.B., B.S., F.R.C.S.,
Postgraduate Medical Institute,
Lady Reading Hospital,
Peshawar, Pakistan.

Summary

Brain abscesses are emergencies and should be dealt immediately. In departments where CT scan facilities are available, it is not a big problem; while in periphery clinical judgement, examination and history of the patient and neurological signs will give lot of clues to save his life with simplest of procedures: a burrhole at temporal area.

General Considerations

This is a purulent infection of brain parenchyma, and results in destruction of the tissues and presents as mass lesion. It provokes development of thick capsule containing inner granulating zone, central necrosis and pus formation.

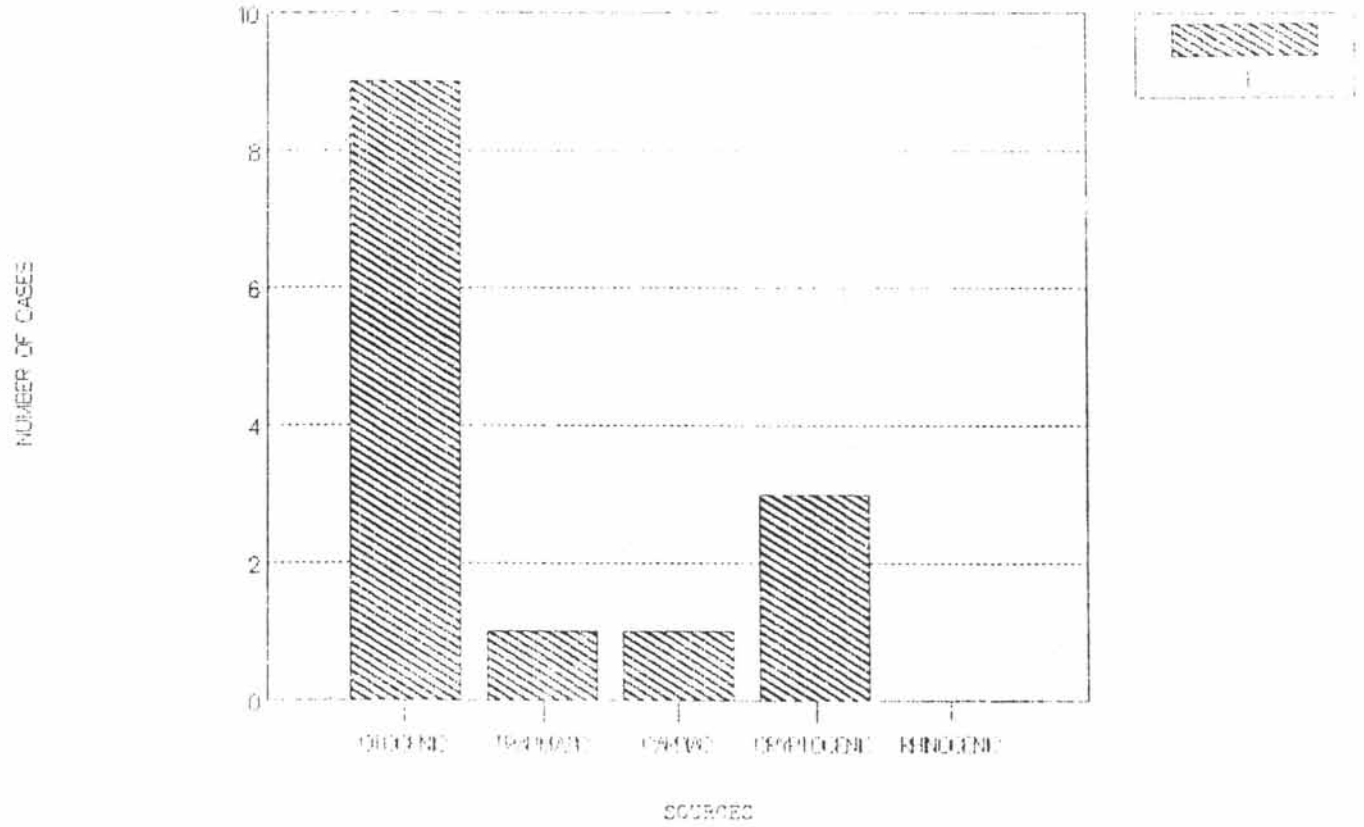
Thick walled abscesses are usually secondary to penetrating trauma, middle ear or mastoid disease, and less frequently due to frontal sinus lesion. Haematogenous abscesses are usually thin walled.

Routes of Infection

1. Otogenic
2. Secondary to Frontal Sinusitis
3. Haematogenous i) Metastatic
   ii) Cyanotic Heart Disease
4. Secondary to Penetrating Trauma and Craniotomy
5. Post-Meningitic
6. Idiopathic

* Associate Professor and Incharge, Neurosurgery Unit, PGMI, LRH, Peshawar.

SOURCES OF INFECTION IN BRAIN ABSCESS



1. Otogenic

i) Temporal Lobe Abscess
ii) Cerebellar Abscess
iii) Occipital Abscess
iv) Parietal Abscess
v) Subdural Empyema
vi) Extradural Abscess

2. Secondary to Sinusitis

i) Contiguous Abscess
ii) Frontal Abscess

3. Haematogenous

A) Metastatic

i) General Sepsis
ii) Purulent Intra-thoracic Sources

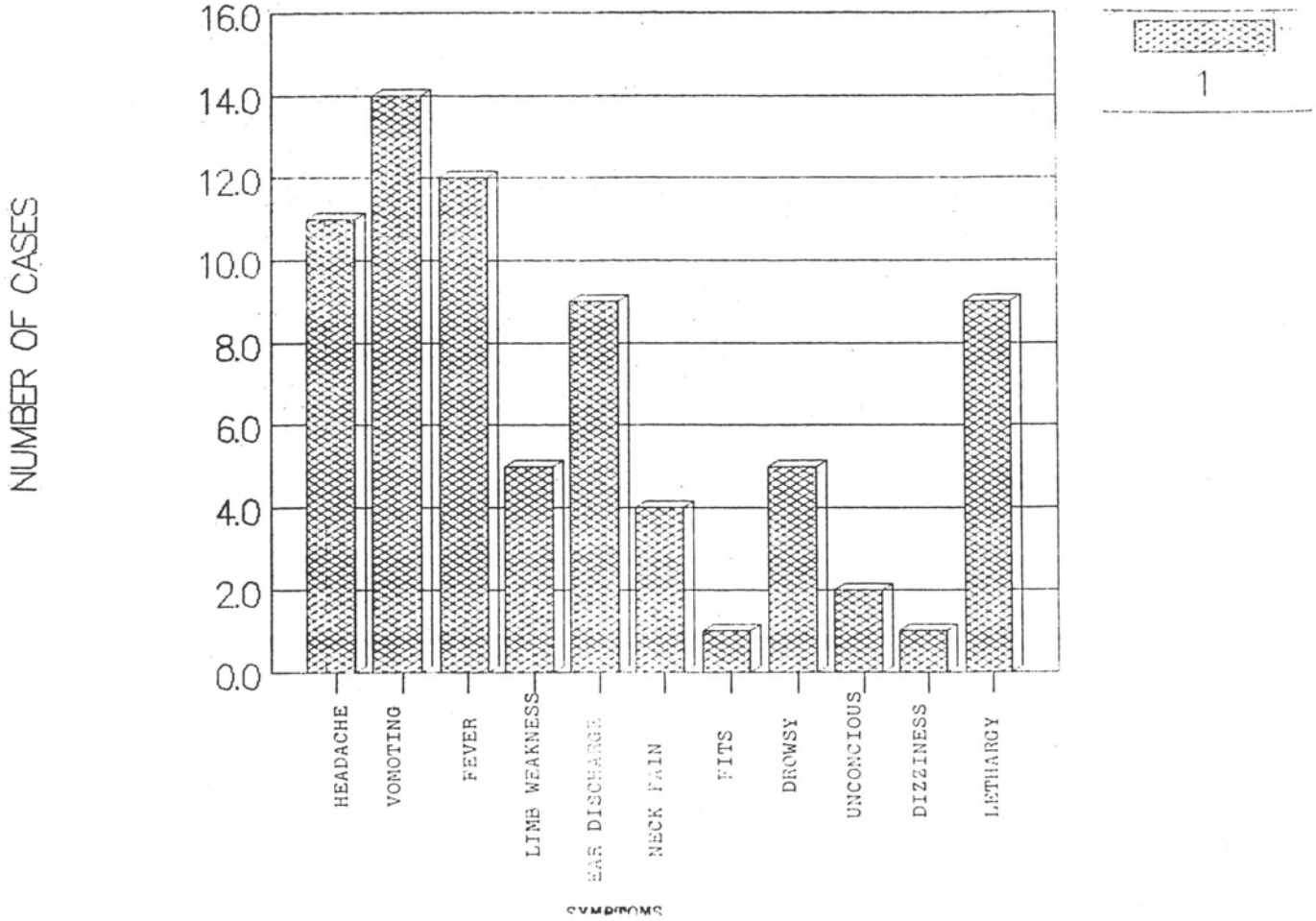
a) Empyema Thoraces
b) Pneumonia
c) Bronchiectesis

iii) Pyogenic Dental Processes
iv) Furuncles
v) Distant Osteomylitis
vi) Infected Prosthetic Devices (Heart Valves)

B) Cyanotic Heart Disease: (Congenital)

(Abscesses of Bacterial Endocarditis)

SYMPTOMOTOLOGY



4. Penetrating Trauma

i) Compound Depressed Fractures
ii) Gun Shot Wounds

5. Post-Meningitic Abscesses

6. Idiopathic Causes

Material and Methods

Two groups of 14 patients each were studied. In the first group 14 cases of brain abscess were managed before the introduction of CT scanner in Lady Reading Hospital, Peshawar. These were between 1986-1988 with the collaboration of ENT department which provided the bulk of cases.

Between 1988-1991, another group of 14 cases was managed and by now the Scanner was available.

In the first group, age of the patient, onset of the symptoms, with or without associated ENT problems, presentation and signs of intra-cranial involvements were considered.

In the second group, CT evaluation was of cardinal importance.

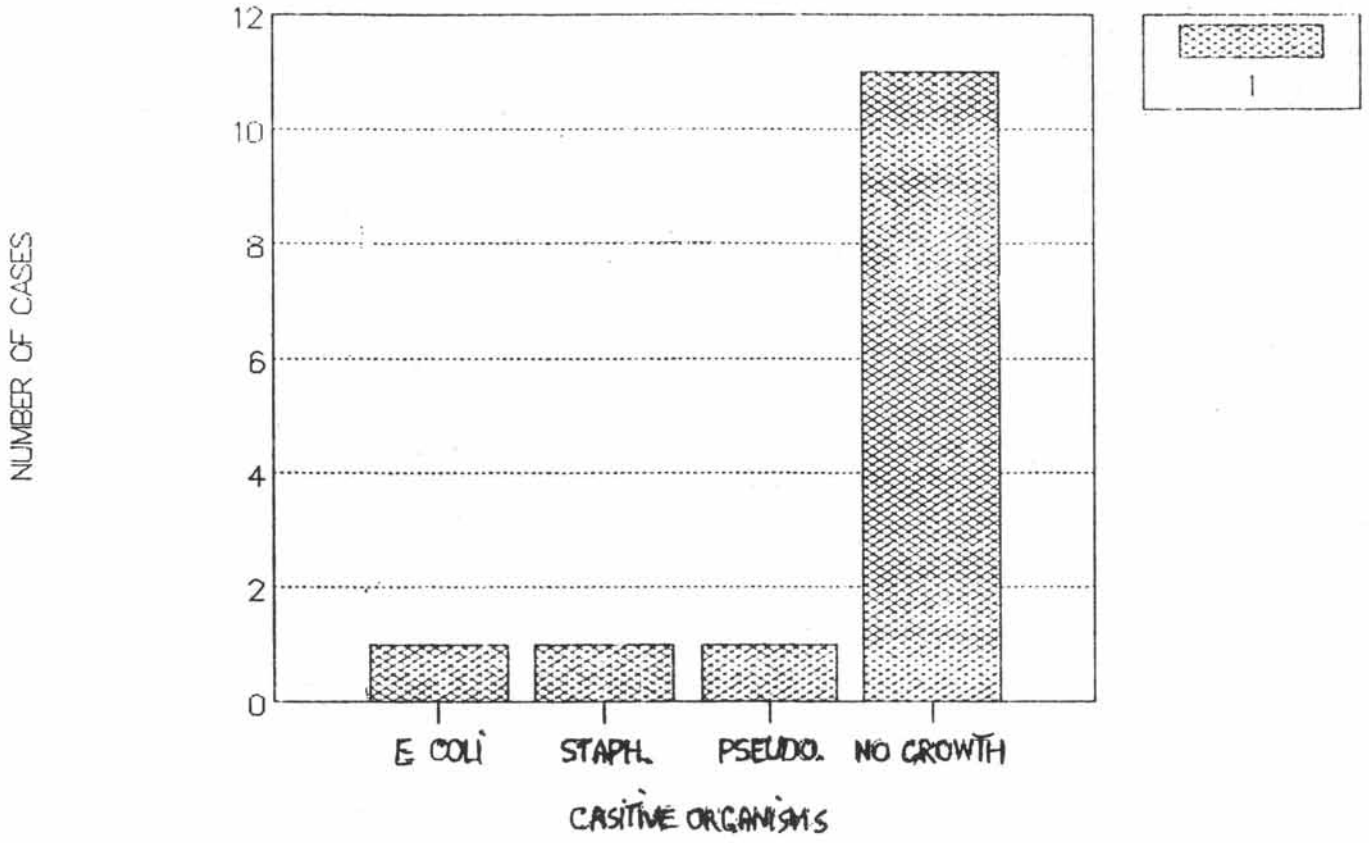
In the first group, majority of the cases were in either first or second decade of life, and about 50% of cases were between 10-19 years of age.

Sex incidence was equal i.e. 50% male and female.

In 60% cases the source of infection was otogenic, in 25% no source was found and a very small percentage belonged to post- traumatic and haemotogenic group.

OBSERVED CLINICAL SIGNS
1
10.0
8.0
6.0
4.0
2.0
0.0
NUMBER OF CASES
NO PAPILLOEDEMA
PAPILLOEDEMA
NECK STIFFNESS
UNCONCIOUS
HEMIPLEGIA/
HEMIPARESIS
EAR DISCHARGE
CYANOSIS
CLUBBING
ATAXIA
TACHYPNOEA
SIGNS

ETIOLOGICAL AGENTS IN BRAIN ABSCESS



Symptomatology

Headache and vomiting were the major symptoms, along with fever and lethargy; ear discharge with neck stiffness in 35% cases; hemiparesis or frank hemiplegia in 36% cases. 35-40% cases were drowsy on admission, and 15% presented with unconsciousness. In this group no one presented with cerebellar symptoms.

Clinical Signs

Neck stiffness was present in 45% cases. Ear discharge in 65% cases. Papilloedema and hemiparesis/hemiplegia were seen in 36% cases, while no papilloedema in 64% cases. The other signs included unconsciousness, ataxia, tachypnoea etc.

Clinical Diagnosis

Depending upon clinical signs and symptoms, diagnosis of brain abscess was made. The guide lines were taken from presence of otogenic symptoms, hemiparesis or hemiplegia, fever, neck stiffness, lethargy, headache and vomiting and papilloedema.

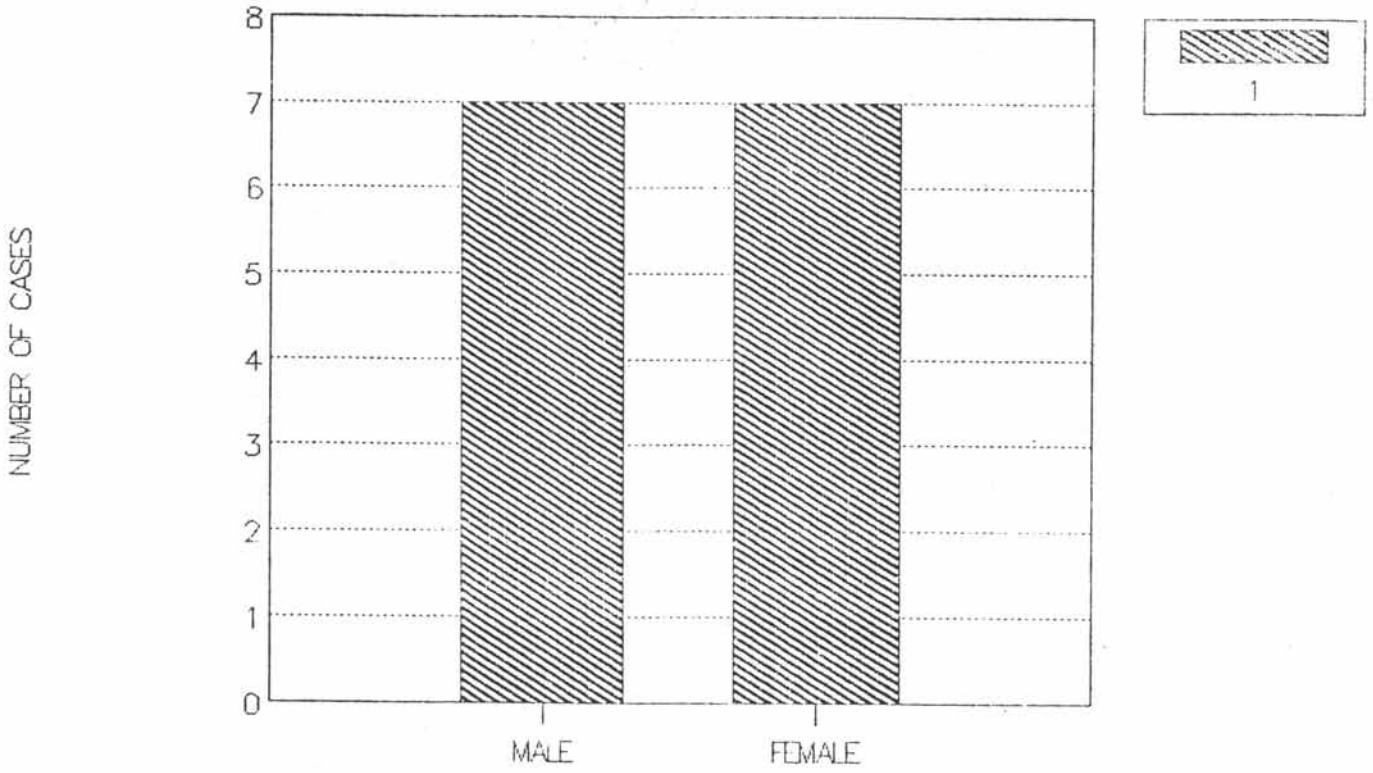
In such cases a burrhole on the side of the ear infection, and contra-lateral to the hemiplegia side was made, in the temporal region and pus was drained. In unconscious patients, further guide line was taken from the side of the papillary dilatation.

The procedure was done in emergency and often under local anaesthesia.

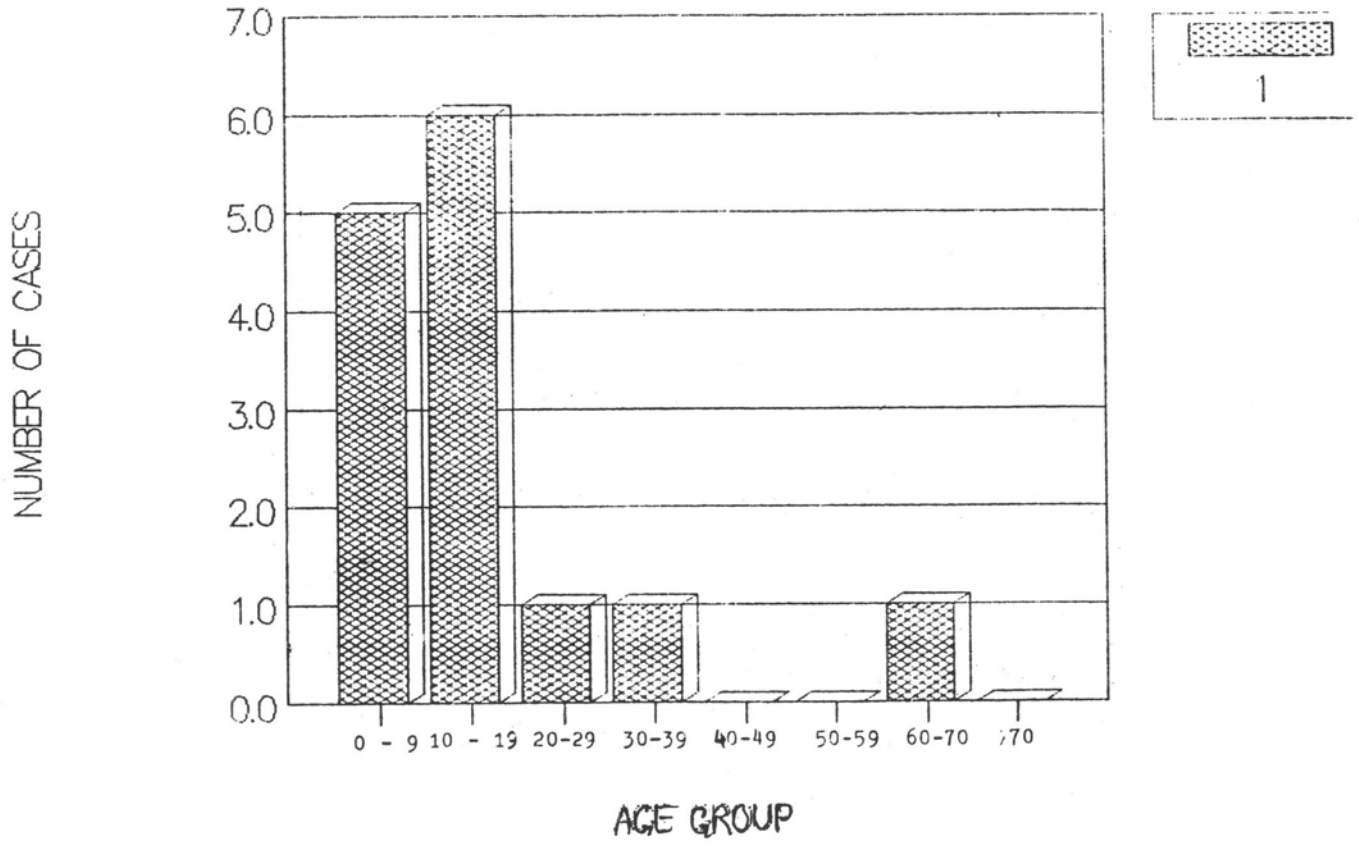
Etiological Agents

In 75% cases no etiological agent was seen on culture of the pus while in 8% cases each E. coli, Staph. aurious and Pseudomonas were isolated.

SEX INCEDANCE IN BRAIN ABSCESS



AGE INCIDENCE IN BRAIN ABSCESS



Antibiotics

Before culture reports were available, the patients were put on Chloramphenicol, Benzyl Penicillin and Flagyl infusion according to the age group, occasionally on Gentacin. After the culture report, appropriate antibiotics were substituted; and in case of no growth, the same regimen was carried out.

The antibiotics were given for 3 weeks indoors, carrying on to a period of six weeks in certain cases.

Re-aspiration

In majority of cases a re-aspiration of the abscess was done after 48 hours and sometimes third and fourth aspiration was necessary.

Mastoid Operation

All otogenic cases underwent radical mastoid operation in second week after abscess was drained.

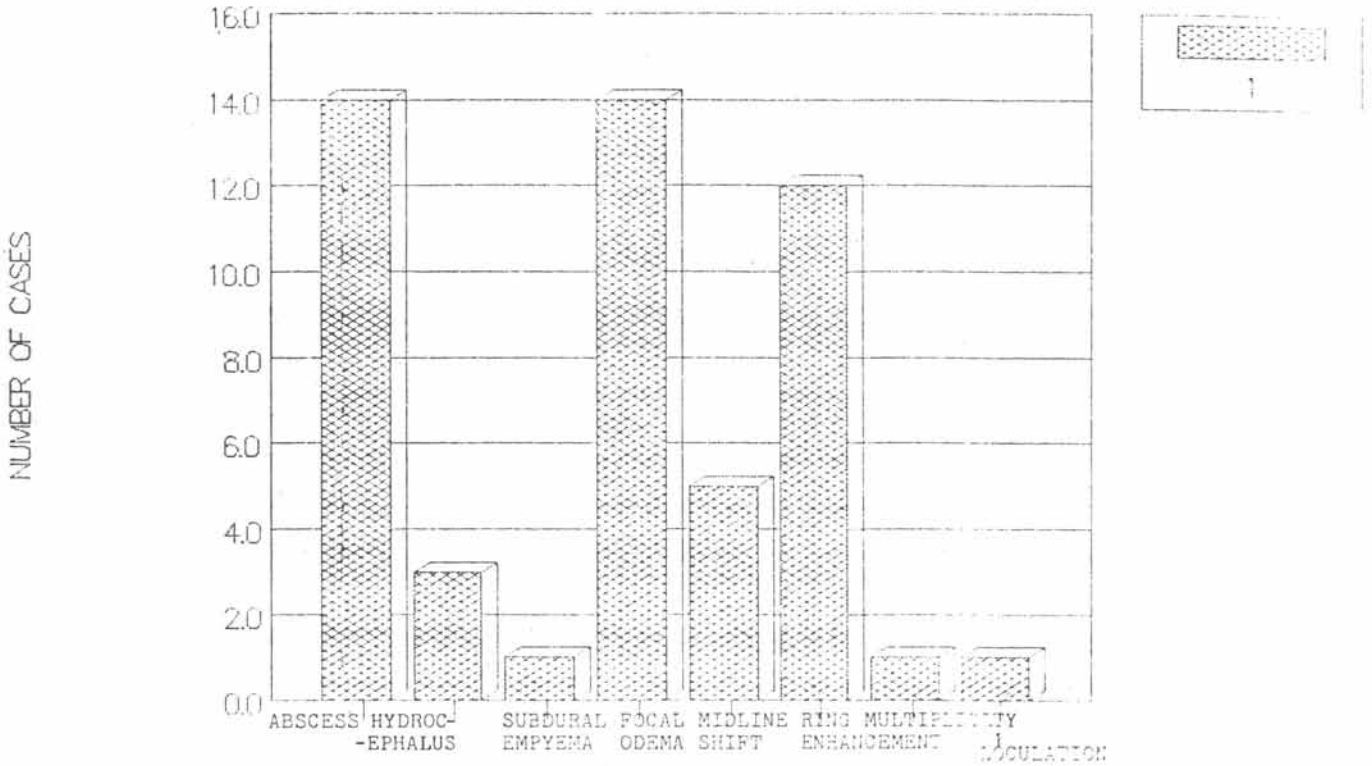
Mortality and Follow Up

In this group of 14 cases, one patient died who presented in unconscious state, fixed dilated pupils, and fitting, with ear- discharge. Pus was aspirated, and patient was put on anti-convulsants and appropriate regimen, but expired in the morning.

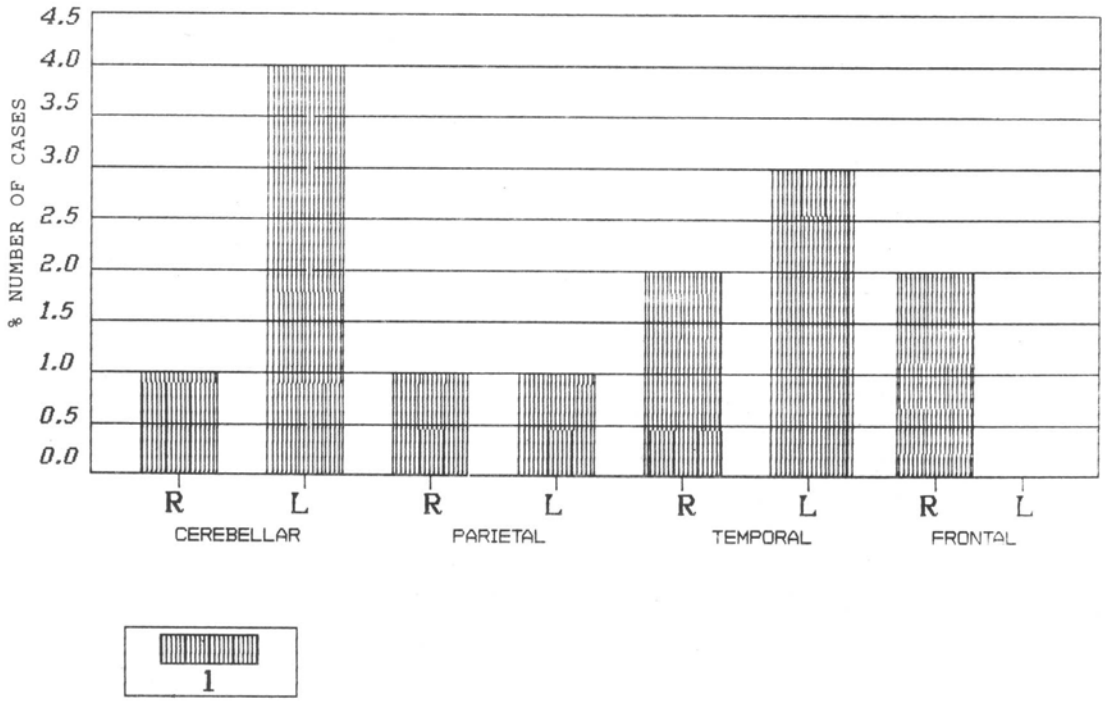
The follow-up of the cases was carried out in the out-patient department for a period of 12-20 months, about 18% cases required anti-convulsant cover. The seizures ranged from a minor fit to a full fledged grand-mal attack.

Majority of the patients were symptom-free till todate.

CAT PERFORMANCE IN BRAIN ABSCESS



LOCATION OF BRAIN ABSCESS



CT Scan Evaluated Group

This group of 14 patients was diagnosed by CT Scan between 1988 and 1991.

The criteria to CT scan such patients was history of headache, vomiting, fever, ear discharge, fits, hemiparesis with or without papilloedema and level of consciousness.

The CT scan was performed on emergency basis, and cases were taken up for surgery in the Neurosurgical department of LRH on emergency basis.

The emergency procedure was burrhole aspiration with or without general anaesthesia both for supra- and infra-tentorial lesions.

In one case of high parietal abscess decortiation was done.

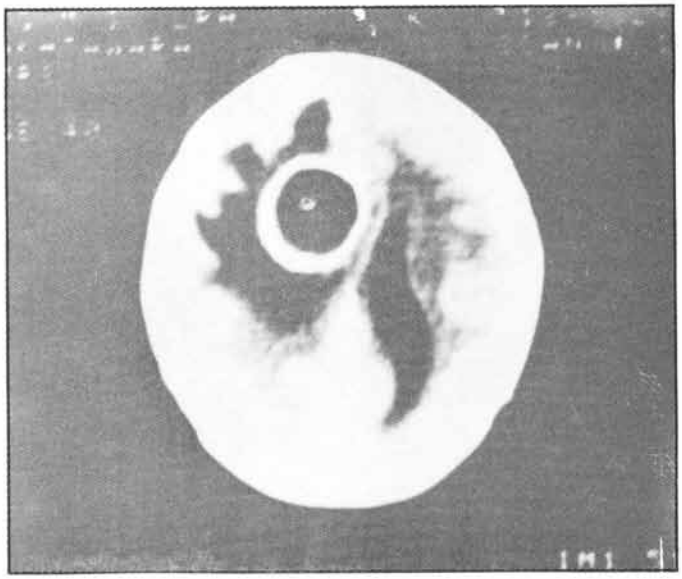
CT Performance in Brain Abscess

1. Location

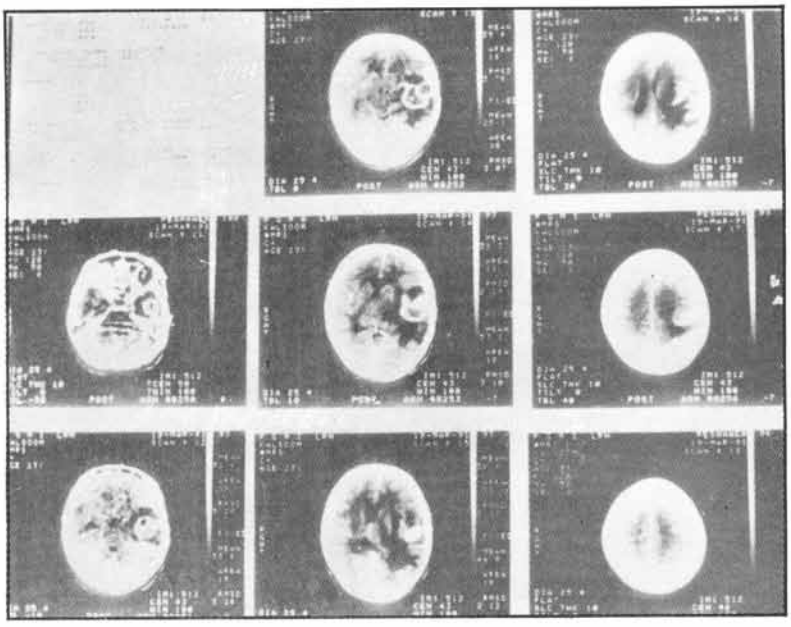
The abscess location gives a wide range of information, regarding its occurrence, method of spread and associated oedema or midline shift. Production of hydrocephalus in posterior fossa abscess determines 'hen before the egg' or otherwise, because hydrocephalus itself is a killer let alone be caused by brain abscess. Cause of abscess i.e. due to mastoid or depressed fracture can be ascertained.

2. Multiplicity

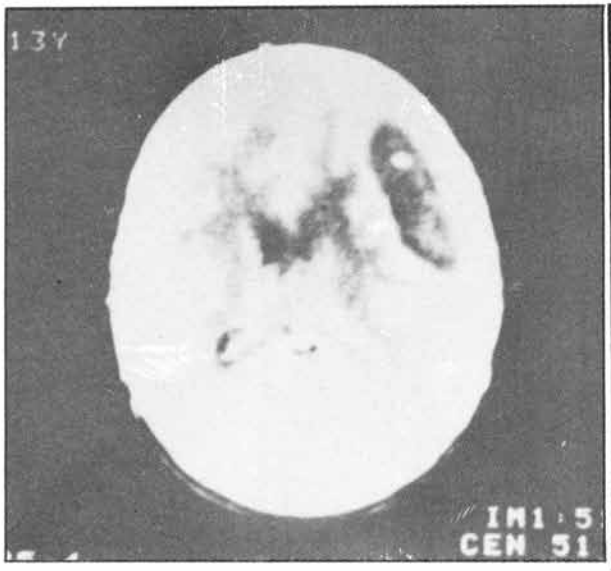
Multiplicity of lesion can be determined by CT scan, and dealt with. Multiple abscesses are a feature of blood borne infection or local and severe trauma.



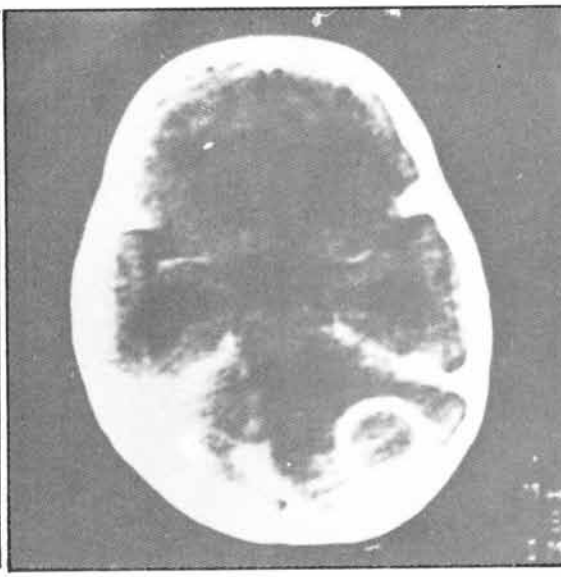
1. FRONTAL ABSCESS



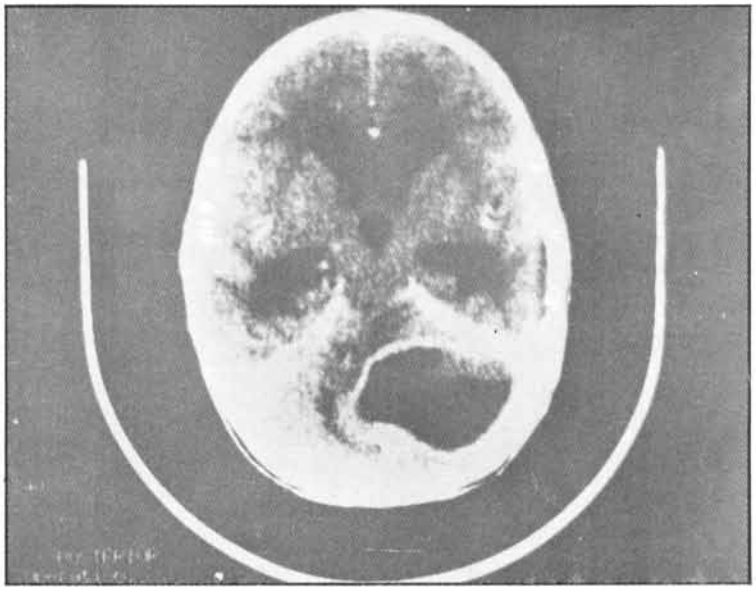
2. TEMPORAL ABSCESS



3. SUBDURAL EMPYEMA



4. CEREBELLAR ABSCESS



5. CEREBELLAR ABSCESS

3. Mass Effect

This is shown only in CT Scan and points towards the severity of the condition and calls for immediate intervention.

4. Size of Abscess

Clearly gives a clue to surgical management.

5. Site of Abscess

This is of paramount importance as there are deep seated abscesses not amenable to surgery, which are these days attempted with sterriotactic surgery. Usually these types of abscesses are treated conservatively.

6. Sub-Dural or Extra-Dural

Collection of pus is better visualized with CT scan.

7. Site of Operation

This is clearly indicated by CT scan although, as in the previous series, clinically quite a bit of information is available from history and examination, but at times the decision can be difficult to make.

8. Re-Scanning and Minimization of Re-Exploration

This is a clear advantage in management when a patient can be re-scanned to see recollection or disappearance of the lesion.

Discussion

There is hardly any doubt that if CT scan is accessible freely day and night then this is the investigation of choice in brain abscesses, as it clarifies it beyond doubt. The doctor on duty should accompany the patient

to the scan room, and see it on the screen rather than wait for the report which might follow next day.

Time period and drainage of abscess is of paramount importance in its management.

This has been our policy that if CT scan is not available or is out of order then not to waste time on other investigations like isotope brain scan whose false negative results are well known, or send the patient for angiography etc. We proceeded with exploration in cases of otogenic abscesses, purely on clinically grounds, and boast that 92% cases were saved in such a way.

Acknowledgement

I am grateful to the incharge of the department of E.N.T., P.G.M.I., Lady Reading Hospital, Peshawar for providing the bulk of cases. I am also thankful to ENT. department of Hayat Shaheed Teaching Hospital, Peshawar for their cooperation.

References

1. Ballantine, H.T. Jr and White, J.C. Brain abscess. New. Eng. J. of Med. 1953, 248: 14-19.

2. Bhandari, Y. and Sarkari, N.B.S. Subdural empyema A. review of 37 cases. J. of Neurosurg. 1970, 32: 35-39.

3. Choudhury, A.R., Taylor, J.C. and Whitaker, R. Primary excision of Brain abscess. Brit. Med. J. 1977, 2: 1119-21, 1538-39.

4. Clavaria, L.E., DuBoulay, G.H. and Mosley, I.F. Intra-cranial infection. Investigation by Computerized axial tomography. Neuro- radiology, 1976, 12: 59-71.

5. French, L.S. and Chou, S.N. Treatment of Brain abscesses. Advances in Neurology. 1974, 6: 269-275.

6. Garfield, J. Management of Supra - tentorial intra-cranial abscess. Review of 200 cases. Brit. Med. J. 1969, 2: 7-11.

7. Show, M.D.M. and Russell, J.A. Cerebellar abscess - 47 cases review. J. of Neur./Neurosurg./Physicat. 1975, 38: 42- 435.

8. Turner, A.L. and Reynolds, F.E. Intra-cranial pyogenic diseases. Pathological and clinical study of the pathways of infection from face, nose, paranasal sinuses etc. Edin, Oliver, Boyd. 1931, 271.