Otogenic Brain Abscess

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THE advent of antibiotics has reduced the incidence of intracranial complications of otitic origin to a considerable extent, yet brain abscess constitutes one of the commonest intracranial complications of middle-ear suppuration. The most frequent cause of brain abscess is suppuration of middle-ear cleft. Though rare, a disease with a high mortality rate is worthy of further study.

Material

Twenty-one cases of otogenic brain abscess that underwent treatment in the Gandhi Memorial and Associated Hospitals, attached to the K.G. Medical College, Lucknow, during the period from 1956 to 1964, were taken up for this study.

Observations and Discussion

Incidence: Only 44 cases of intracranial complications have been observed in 15,090 cases of suppurative otitis media, constituting an incidence of 0·29 per cent. Out of the 44 cases, 21 cases were of brain abscess (Fig. 1). Thus in our series, brain abscess constituted the commonest intracranial complication of otitic origin. On the contrary Dawes (1961) found 40 cases of brain abscess out of 199 cases of intracranial complications. In Pennybacker's (1961) series of 200 cases of intra-cranial complications, brain abscess (85 cases) was the commonest complication. The relative high incidence of brain abscess is probably due to the fact that the antibiotics are more effective in the treatment of other complications such as meningitis. The other reason being that most of the cases of otogenic meningitis are treated by the physicians locally and only the complicated cases of brain abscess are referred to the otologic units.

One peculiar observation in this study is that cerebellar abscess is commoner than cerebral abscess.

TABLE I.

TYPES OF ABSCESS.

	Number of cases	Sex	
		Male	Female
Cerebellar abscess	14	11	3
Cerebral abscess	7	5	2

This observation is just the reverse of what other authors have reported except Stuart and his co-workers (1955). Dawes found only 10 cases of cerebellar

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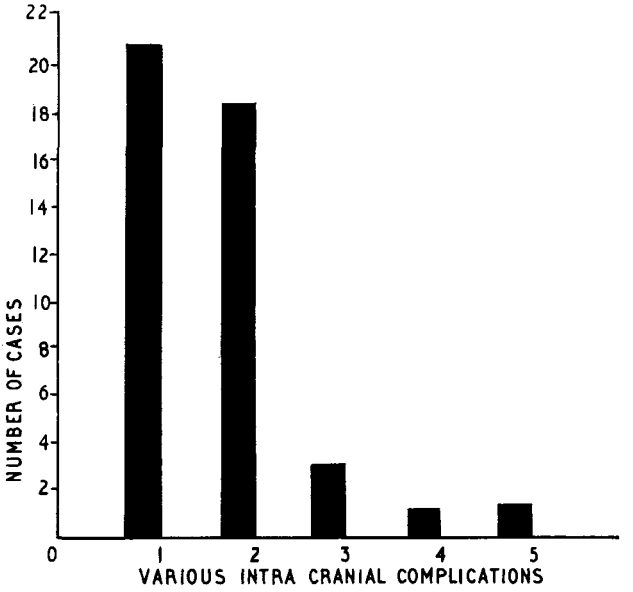


FIG. 1.

Showing high incidence of brain abscess.
Key: 1. Brain abscess
2. Meningitis
3. Lat. sinus thrombophlebitis
4. Cortical venous thrombosis
5. Sub-dural abscess

abscess out of 40 cases and Pennybacker found only 31 cases out of 85 cases of brain abscess. No definite explanation can be given to the high incidence of cerebellar abscess in this series. We would like to mention here one important point in this connection. The common association of cerebellar abscess with lateral sinus thrombosis, extradural and perisinus abscess was noted in this series (Table III). This acts as a predisposing cause of infection to the posterior fossa and the cerebellum. Stuart and co-workers found 15 cases of cerebellar abscess due to chronic suppurative otitis media out of 20 cases of brain abscess.

All cases of brain abscess were found adjacent to the diseased ear and all cases of cerebral abscess were found in the temporal lobe. Two cases of cerebral abscess were found associated with meningitis, while 3 cases of cerebellar abscess were in association with lateral sinus thrombophlebitis. One of the cases of cerebellar abscess was associated with meningitis as well as lateral sinus thrombophlebitis.

Age: Otogenic brain abscess was found to be common in the first three decades of life with a peak incidence in the second (Fig. 2). In the pre-antibiotic era, brain abscess of otitic origin was common in children below the age of 10, but with the advent of antibiotics and efficient treatment of acute middle-ear suppuration, brain abscess became almost unknown in these cases and hence a shift is noticed in the age incidence.

Sex: Out of 21 cases, 16 were males (76 per cent.). The male preponderance

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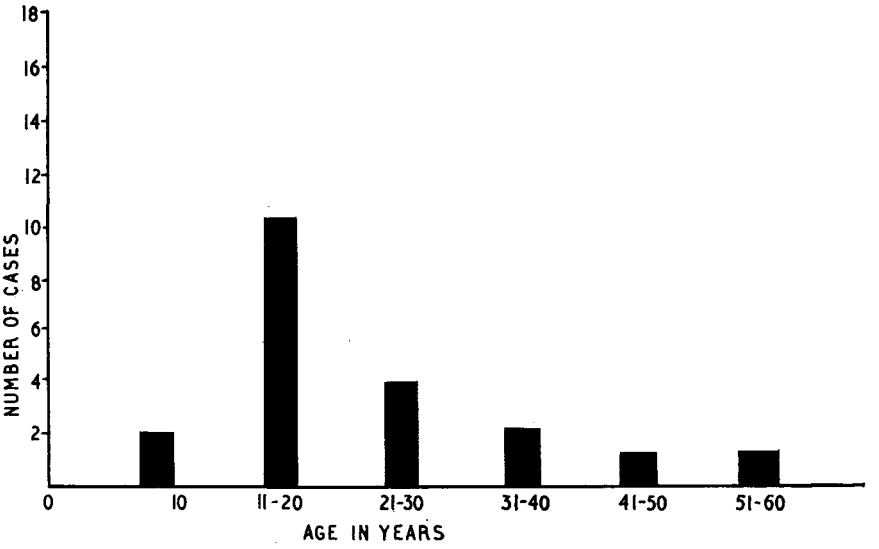


FIG. 2.
Showing peak incidence in second decade of life.

which is in agreement with the observations of almost all other workers, might be explained by the greater incidence of otitis media in males.

Symptoms and signs: The clinical features are shown in Table II.

All patients in the present series presented with earache and headache. That these two symptoms are a constant feature is also agreed upon by other workers like Pennybacker (1961), Dawes (1961), Newlands (1965) and Proctor (1966). We are of the opinion, that development of headache and earache in the course of chronic suppurative otitis media should always arouse the suspicion of intracranial complications. It is very evident from Table II that giddiness and vertigo are the predominant additional symptoms of cerebellar abscess. Nausea and vomiting were complained of in 71·4 per cent. of cases and these symptoms were commoner in cerebellar abscess. Altered level of consciousness is strongly

TABLE II.
CLINICAL FEATURES OF ABSCESSES.

Symptoms and signs	Cerebral abscess	Cerebellar abscess	Percentage
1. Earache	7	14	100
2. Headache	7	14	100
3. Diminished consciousness	4	12	52·4
4. Nausea and vomiting	4	9	71·4
5. Giddiness and vertigo	—	10	49·5
6. Pyrexia	4	4	49·5
7. Neck rigidity	2	7	42·8
8. Papilloedema	4	10	66·7
9. Localizing signs	3	8	52·4
10. Nystagmus	—	10	49·5

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suggestive of intracranial spread of disease. Temperature in cases of brain abscess may be normal or subnormal and is rarely raised. In the present series, 38 per cent. of cases showed mild to moderate rise in temperature. This series showed neck rigidity in only 9 cases (42·8 per cent.), out of which 7 were cerebellar abscess. Neck rigidity is a commoner sign in cerebellar abscess than in cerebral abscess.

Harpman (1955) emphasized the importance of nominal aphasia as a most important indication of localization of temporal lobe abscess. This sign was present in only one case of left temporal lobe abscess in a right-handed person. It is definitely known to be the most important localizing sign though it is a late sign and by no means constantly present. Localizing signs are more frequent in cases of cerebellar abscess. Nystagmus was observed in 10 cases of cerebellar abscess and was associated with other cerebellar signs.

Investigations

Routine blood and urine examination was done in all cases. There was mild to moderate leucocytosis in almost all cases, suggesting a chronic infection.

Lumbar puncture was done in 12 patients with great care. C.S.F. findings were normal in only one case, that of a cerebellar abscess associated with intracranial dermoid. In all other cases, the pressure, the protein content and cell count were raised. Lumbar puncture has a place not only in the diagnosis, but also in the treatment of certain cases of intracranial complications. Repeated lumbar puncture may be required in cases of brain abscess associated with meningitis, once the abscess has been treated.

Ventriculography was performed in 2 cases of cerebellar abscess with positive findings. Carotid angiography was done in 3 cases of temporal lobe abscess, one of cerebellar abscess, with positive findings in cerebral cases and negative in the cerebellar case. Thus we are of the opinion that ventriculography is likely to be a helpful investigation in suspected cases of cerebellar abscess, and in temporal lobe abscess carotid angiography is likely to be of help.

Pathology and Bacteriology

In the present series we have observed that all cases of brain abscess were found adjacent to the diseased ear. This observation is in general agreement with other authors (Stuart, O'Brien and McNally, 1955; Dawes, 1961).

Mastoidectomy was performed in 19 cases. The findings are shown in Table III.

TABLE III.

Operative Findings.

Type of brain abs.	No. of cases	Lat. sinus thrombosis	Extradural and perisinus abs.	Tract	Granulation	Bony erosion	Cholesteatoma
1. Cerebral	5	—	1	2	5	5	1
2. Cerebellar	14	3	4	7	14	14	5
Total ..	19	3	5	9	19	19	6

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The operative findings clearly indicate that the complications in the present series of cases were due to the delay in the timely surgical treatment in the management of chronic suppurative otitis media. The delay may be partly due to the masking effect of antibiotics.

Out of 21 cases, pus was cultured in 20, in all of which growth was found. In one case no pus culture could be done as the patient expired before any surgical interference. Out of 20 cases, 8 yielded single and 12 cases mixed organisms.

TABLE IV.

	Pus culture done	Pure culture		Mixed culture
		Gram +ve cocci	Gram −ve bacilli	
Cerebral abscess	6	—	2	4
Cerebellar abscess	14	1	5	8
Combined	21	1	7	12

Gram negative bacilli like proteus and pseudomonas were the commonest organisms isolated both in pure and mixed cultures. This is due to the fact that all cases were found in chronic suppurative otitis media. The changing flora in the suppurative otitis media may also be due to excessive exposure to antibiotics. It is quite evident from Table IV that the majority of cases were due to mixed organisms.

In the present series it was found that organisms were least sensitive to sulpha (5 per cent.) and penicillin (5 per cent.) while most were sensitive to chloramphenicol (70 per cent.). Seven cases (35 per cent.) were found sensitive to streptomycin and tetracyclines. Thus chloramphenicol is the most effective antibiotic in the treatment of otogenic brain abscess. We emphasize here that antibiotics should always be given strictly according to the culture and sensitivity report.

Treatment

All cases were first put on systemic penicillin and sulpha and when culture reports became available appropriate antibiotics were given. We advise dehydration therapy with 50 per cent. glucose in cases of brain abscess as the method of choice to relieve the patient from symptoms and signs of raised intracranial tension, especially in cases of cerebellar abscess to avoid the risk of cone formation during lumbar puncture.

Out of 7 cases of temporal lobe abscess, 4 underwent mastoid exploration and drainage of abscess through the mastoid route. One patient was treated with burrhole aspiration of abscess followed by mastoidectomy as the condition was extremely poor. In another case the abscess was aspirated through a temporal burrhole, but the patient died of respiratory failure after 10 hours. Yet another patient did not have any surgical interference as she died soon after admission.

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Out of the 14 cases of cerebellar abscess, 11 were treated by mastoid exploration and drainage of abscess. Out of these, 4 required repeated drainage. One patient had re-exploration of mastoid and excision of the abscess due to association with intracranial dermoid. Another patient was treated first by excision of abscess followed by mastoidectomy as the patient's general condition was very poor. Still another patient underwent mastoidectomy first and aspiration of abscess later through a burrhole, because the abscess could not be found through the mastoid route.

TABLE V.

TYPES OF OPERATION.

	Mastoid Op. and drainage	Mastoid Op. followed by aspiration	Aspiration followed by mastoid Op.	Excision
Cerebral abscess	4	—	2	—
Cerebellar abscess	11	1	—	2

In the surgical management of otogenic brain abscess, various authors have differing views. Myers and Ballantine (1965) and Newlands (1965) are of the opinion that brain abscess should be dealt with primarily by aspiration through burrhole in the temporal or occipital bone and mastoid exploration should be done at the earliest safe time during convalescence. Repeated aspiration is undertaken when the patient's general and neurological condition does not improve or if shrinkage of abscess is not demonstrated radiologically and aspiration may be initially required daily or on alternate days. Excision should be reserved for those cases where there is thick capsule formation with pronounced physical signs and for those in whom there has been a failure of shrinkage after aspiration due to the presence of loculation or associated communicating abscesses. In the present series of 20 cases that underwent surgery, 16 cases were treated by mastoid exploration and drainage of the abscess. Our observations regarding the surgical management of otogenic brain abscess clearly indicate that the mastoid route is still the best method for drainage of the abscess. In this respect, we agree with Davis (1951), Shuster (1952) and Proctor (1966). The otologist is in a better position to uncover the pathology in the middle-ear cleft and other associated intracranial complications (Table III). He is also in a position to explore a fistulous tract to the abscess cavity if it exists. If an abscess cannot be reached through the mastoid route or the patient's general condition is very low, aspiration through burrhole should be tried. Excision should be restricted to those cases which do not respond to these measures, due to loculations or due to an associated pathology as was the case with intracranial dermoid in this series.

The services of a neurosurgeon are required in those cases of otogenic brain abscess which are situated at a distance from the diseased ear or when repeated drainage through the mastoid cavity fails due to multiple loculi. We are of the opinion that with better co-operation and team work between neurosurgeon and otologist many lives can be saved.

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Mortality

Out of 21 cases of brain abscess, 16 were cured. The results are given in Table VI.

TABLE VI.

RESULTS OF TREATMENT.

	Total no. of cases	No. of cases expired	Mortality rate
Temporal abscess	7	3	42·8%
Cerebellar abscess	14	2	14·2%
Total	21	5	23·8%

In our series the mortality rate in cases of otogenic brain abscess was 23·8 per cent. Wood (1952) has reported 22·9 per cent. while Ballantine and White (1953) reported 34 per cent. mortality rate as compared to the pre-antibiotic figure of 80 per cent. Pennybacker (1961) showed a decrease in the death rate of brain abscess from 36 per cent. to 5·7 per cent. while Myers and Ballantine (1965) reported 27 per cent. mortality. In the present series the mortality rate in cerebral abscess (42·8 per cent.) was found to be very high as compared to cerebellar (14·2 per cent.).

Follow-up: Jooma and his co-workers (1951) have reported 8 per cent. recurrence in follow-up cases of brain abscess which were treated by excision. But none of our cases showed recurrence. Slight neuromuscular inco-ordination was noticed in 2 cases of cerebellar abscess which were treated by excision. Only 1 case of cerebral abscess developed epileptic fits, 4 months after operation. Our observations are in agreement with Jooma that excision increases the risk of adding to certain neurological defects.

Summary

Brain abscess is the commonest intracranial complication of otitic origin. Cerebellar abscess is commoner than cerebral. Otogenic brain abscess almost invariably follows chronic suppurative otitis media and commonly occurs in the first three decades of life with peak incidence in the second decade.

All cases were due to direct spread of disease and were situated adjacent to the diseased ear.

Gram negative bacilli like proteus and pseudomonas were the commonest organisms isolated both in pure and mixed cultures. Majority of the cases were due to mixed flora. The organisms were most sensitive to chloramphenicol and least to sulpha and penicillin. This stresses the importance of using this drug in the management of otogenic brain abscess.

All cases of otogenic brain abscess should preferably be treated through mastoid route. A close co-operation between otologist and neuro-surgeon has been emphasized in the diagnosis and management of otogenic brain abscess.

Mortality rate in cases of cerebral abscess is comparatively high.

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