Chronic abscess of the brain stem

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The incidence of solitary brain stem abscess is less than 4% of all posterior fossa abscesses, and probably less than 1% of all intracranial abscesses. Two cases are reported, both presenting as chronic progressive clinical problems and initially diagnosed as gliomas. It is suggested that aspiration is a more suitable treatment than excision, and that in cases secondary to otogenic disease, radical mastoidectomy might have been an adequate method of prophylaxis.

In Gowers' (1893) experience abscesses of the brain stem were rare (1.7%—that is, four out of 231 abscesses): pontine abscesses were more common than medullary abscesses. More recent reports (Van Gilder et al., 1974; Danziger et al., 1974) suggest that brain stem abscess remains a rare condition, and each report one case of survival after surgery.

The purpose of this report is to describe two cases of brain stem abscess, both of which presented as chronic brain stem masses which were initially thought to be gliomas, and one of whom survived after surgery.

Case 1

MR, a 60 year old woman, was first seen in September 1965. She had a 15 year history of tinnitus with a progressive sensori-neural deafness over the final year. Within the preceding months she had developed occipital headaches, numbness of the right side of the face and tongue for four weeks, and sudden onset of a right lower motor neurone facial weakness. Examination confirmed the deficits, but strength duration curves showed some conduction in the seventh nerve which on subsequent recordings appeared to improve. Skull radiographs were normal, as was the fourth ventricle judged by ventriculography with sodium iophendylate. A lumbar pneumoencephalogram showed only slight dilatation of the lateral ventricular system: the lumbar CSF contained 600 white blood cells per c.mm (80% polymorphs), 6 g/l protein and 4.0 mmol/l glucose.

She was readmitted in May 1966 complaining of continuing headaches, but on examination her condition was unchanged. Lumbar pneumoencephalography again confirmed the increase in the size of the lateral ventricles: the CSF now contained 40 monocytes per c.mm and a protein level of 8.3 g/l.

Suddenly in August 1967 she developed a left hemiplegia, which had been preceded for one month by more severe headaches associated with vomiting, and transient episodes of complete loss of vision for a few seconds. She was drowsy, had papilloedema, nystagmus on lateral and upwards gaze, and a flaccid left hemiplegia. The cranial nerve signs were unchanged. Iophendylate ventriculography now revealed a thinned aqueduct which was displaced backwards and to the left. It was felt that the clinical history and the investigations indicated an intrinsic glioma of the brain stem. She died in December 1967, and postmortem examination revealed a well encapsulated abscess (40×35×40 mm) in the pons. There was no evidence of a primary source of infection.

Case 2

CS, a 10 year old girl, was first seen in May 1975, some five months after a febrile illness. She complained of headache and disturbance of vision for two months, and for several months her right ear had been discharging pus. On examination papilloedema, diplopia on left lateral gaze, and ataxia of the lower limbs were found. Keratin debris and a possible perforation in the attic of the right ear were present. The ear was cleaned and treated with ampicillin. CT scan (EMI scan) demonstrated dilatation of the whole ventricular system. This was confirmed by meglumine iothalamate (retro Conray 35%, w/v; May and Baker) ventriculography (Fig. 1a), which showed obstruction of the outflow foramina of the fourth ventricle. Ventriculo-peritoneal drainage was therefore established, and after this she progressed well.

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Fig. 1 Ventriculograms showing (a) non-communicating hydrocephalus, and (b) blocked aqueduct three months later.
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In August 1975 she suddenly developed a right facial weakness, together with pain over the right mastoid and headache and had to be readmitted to hospital. Meglumine iothalamate ventriculography (Fig. 1b) showed an obstruction at the upper end of the aqueduct and lumbar pneumoencephalography suggested some enlargement of the pons: CSF contained 263 white cells per c.mm of which the majority were lymphocytes and monocytes. Vertebral angiography was not helpful. Review of the radiology at this time seemed to indicate adhesions around the brain stem and in the aqueduct after a meningitic illness which was secondary to ear disease. A right radical mastoidectomy was carried out when a large amount of cholesteatoma was found, but the middle fossa dura mater was seen to be healthy. She improved after the operation except for the right seventh nerve palsy.

In March 1976 she was readmitted because she had become less active and was tending to fall to the left. Examination showed a left third nerve paresis, right sixth, seventh, ninth, tenth, and twelfth nerve palsies, and a spastic left hemiparesis. Four vessel angiography was not helpful, but after revision of the shunt she improved slowly. The original diagnosis was modified: we felt that in addition she now had a pontine glioma.

In September 1976 she presented in a state of depressed responsiveness after a seizure. She had also been dysphagic for three days. A CT scan (Fig. 2a) demonstrated a mass, which enhanced with sodium iothalamate 70% w/v (Conray 420: May and Baker), in the brain stem extending into the right cerebello-pontine angle and supratentorially into the medial posterior temporal region. Posterior fossa exploration confirmed the presence of a mass which on smear biopsy was thought initially to be a glioma. Subsequent paraffin sections did not confirm this diagnosis, and combined posterior fossa and right sided transventricular approach was made to the mid-brain and the pons, which were grossly enlarged and hard. Aspiration obtained 3 ml pus from within the pons but microscopy and culture failed to identify any organisms.

Postoperatively she improved over a few days to the stage where she was alert, able to walk, eat, was continent, and could speak intelligibly. After a four week course of chloramphenicol, a repeat CT scan (Fig. 2b) suggested that (even though the positioning of the patient was not quite comparable with that of the CT scan before surgery) the fourth ventricle had returned almost to the midline and there was only minimal evidence of any area of enhancement. On the advice of a bacteriologist, antibiotic treatment was continued for a further month; this consisted of a course of clindamycin and ampicillin followed by one of erythromycin. The patient continued to improve, and three months after the operation she has a fixed deficit consisting of a right hemiparesis, a right sixth nerve palsy, and is dysarthric though clearly understandable.

Discussion

Hulme (1961) suggested that the incidence of solitary brain stem abscesses was less than 3%, but even this is almost twice that estimated by
Gowers (1893). During the 26 year period from December 1950, 54 cases of posterior fossa abscesses (51 cerebellar, two brain stem, and one subdural) have been admitted to the Institute of Neurological Sciences in Glasgow which acts as a secondary neurosurgical referral service for a population of approximately three million. Therefore, the incidence of brain stem abscesses is less than 4% of all posterior fossa abscesses. Temporal lobe abscesses are twice as common as cerebellar abscesses (Wright and Grimaldi, 1973). Other supratentorial sites—for example, frontal and parieto-occipital—are at present over twice as commonly affected as the temporal lobe (Martin, 1973; Sampson and Clark, 1973), and with the continuing decline in the incidence of abscess secondary to otogenic infective disease (Carey et al., 1972; Martin, 1973; Sampson and Clark, 1973; Wright and Grimaldi, 1973) will become relatively more common. The incidence of solitary brain stem abscess is, therefore, likely to be appreciably less than 1%; indeed several large series do not contain such a case (Loeser and Scheinburg, 1957; Le Beau et al., 1973; Morgan et al., 1973). Since Weickhardt and Davis's review of the literature (1964) we have found detailed reports of five further brain stem abscesses (Corbella et al., 1967; Mazars et al., 1972; Van Gilder et al., 1974; Danziger et al., 1974; Robert et al., 1975), and seven in which no further details are given (Krayenbühl, 1967; Gurdjian and Thomas, 1969; Carey et al., 1972; Sampson and Clark, 1973).

Most of the cases previously reported have short neurological histories (Weickhardt and Watts, 1944; Hulme, 1961; Weickhardt and Davis, 1964; Van Gilder et al., 1974). Death usually ensues quickly, often in days. However, this is not inevitable: Weickhardt and Watts (1944) quote a patient described by Moniz (1934) who survived six months, and one of Abercrombie's (1836) who survived three months (case 7); Weickhardt and Davis (1964) had one patient who survived for eight months (case 3). Danziger et al. (1974) described a case which was similar to the two reported here in that the working diagnosis was that of a brain stem glioma and the correct diagnosis was not made until some four and a half months after the onset of neurological symptoms.

Although classical brain stem syndromes occur in only a few patients (Weickhardt and Davis, 1964), the high frequency of cranial nerve lesions, and especially facial weakness and dysphagia, together with headache and fever, commonly allows an accurate anatomical localisation, but the pathological diagnosis remains difficult in both acute and chronic cases. Particularly in the latter group, there is a slow indolent progression of brain stem dysfunction which often leads to the diagnosis of a glioma. Both brain stem gliomas (White, 1963) and abscesses (Weickhardt and Davis, 1964) not uncommonly cause multiple cranial nerve lesions without producing long tract signs until later in the natural history of the disease. In the case of the abscess this may be explained by the macroscopic pathology. Abscesses at other sites in the brain are usually globular but in the brain stem, they are elongated and will tend to displace rather than interrupt the long tracts. Case 1 in this report survived 26 months after the onset of neurological symptoms without any definite treatment, and was able to carry on a relatively normal life for the first 21 months. Case 2 improved dramatically particularly with respect to responsive level and long tract function after aspiration of the abscess.

The difficulty of diagnosis is compounded by the lack of any apparent infective source in 37% of cases (Weickhardt and Davis, 1964), which obscures a clue to the possibility of an intracranial infective process. Case 1 was such a case. Weickhardt and Davis (1964) reported also that 34% of pontine abscesses in the literature resulted from haematogenous spread, whereas 29% resulted from direct extension, 91% of these latter from otogenic disease. Furthermore, a non-communicating hydrocephalus which results from fourth ventricular outlet blockage which is secondary to post-meningitic adhesions may precede the development of a pontine abscess (case 2). Thus if a non-communicating hydrocephalus progresses to involve the aqueduct, and particularly if there is any suggestion of enlargement of the brain stem, investigation for abscess should be undertaken even though the clinical diagnosis is almost certainly a glioma. Computed tomography is of value in demonstrating an abscess (Shaw and Russell, 1977), but the appearances are not specific and, therefore, surgical exploration should be carried out if there is any doubt about the diagnosis.

Recently Van Gilder et al. (1974) and Danziger et al. (1974) have both described survivors after surgery for pontine abscess. In the former's case the abscess was drained after which the patient made a good functional recovery and was able to return to work. Robert et al. (1975) similarly aspirated a pontine abscess which was followed initially by an improvement in the patient's responsive level. However, sudden death occurred eight days after the operation, probably because it was not appreciated that the abscess was multicellular. Danziger et al. (1974) were more radical,
and excised the abscess almost completely, but although the child survived, she is severely disabled. Though there is little experience upon which to judge, it would seem that aspiration is more satisfactory than excision as the former should result in less severe neurological deficit. Internal drainage of cerebrospinal fluid may be required to control the hydrocephalus.

Though brain stem abscess is a rare condition, its devastating nature is a further argument in favour of a very radical surgical approach to infective middle ear disease (Wright and Grimaldi, 1973; Shaw and Russell, 1975), as a prophylaxis against the development of secondary intracranial suppuration.

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References


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