OTOGENIC MENINGITIS WITH CAVERNOUS SINUS THROMBOSIS

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Since the introduction of antibiotics cavernous sinus thrombosis has become a rare condition especially in association with an otogenic purulent meningitis. Two cases were seen in a paediatric department within 18 months; they are presented here to call attention to the therapeutic problems involved.

CASE REPORTS

Case 1

In December 1955 a 9-year-old boy was admitted with a history of headache, otalgia, fever and vomiting for 2 days. Two months previously the patient had received an injection of penicillin for otitis with recovery and no subsequent complaints. On admission the patient was severely ill, delirious, restless, vomiting, and with a high fever (40°C) and marked meningeal signs, including opisthotonus. There was marked reddening of the right ear-drum, while a purulent discharge welled up from the left ear. On the left side proptosis, chemosis with an oculomotor palsy and a peri-orbital inflammatory swelling were present. Cerebrospinal fluid was purulent with 17,800 polymorphonuclear cells per c.mm., 600 mg.% protein, and 8 mg.% sugar. Cultures from the cerebrospinal fluid, blood, and pus from the ear were all sterile.

A short while after admission, severe convulsions occurred; and the patient lapsed into a deep coma. An electro-encephalogram showed a severe disturbance, especially marked over the left temporal area.

Massive antibiotic therapy (streptomycin 1 g., chloramphenicol 1 g., achromycin 600 mg., intravenous sulphadiazine 1 g. per day) was given together with blood and parenteral fluids. A right mastoidectomy was performed within 24 hours of admission. Severe destructive changes were present at operation. The clinical condition remained serious, with high fever and deep coma. On the 4th hospital day, the patient returned to the operating theatre for a left mastoidectomy. Only a mild inflammatory lesion was found. In order to assist in the aspiration of the secretions which were pooling in the hypopharynx and causing 'secretional anoxia', a tracheotomy was performed.

On the 8th hospital day, with the patient still comatose, a right spastic hemiplegia with a left facial palsy developed. A persistent disturbance over the left temporal area was found on electro-encephalography. The inflammatory lesion of the left eye continued to be severe with the development of ulceration requiring cortisone eye-drops.

The patient was in a coma for 10 days, and then gradually improved. By the 15th hospital day the administration of intravenous fluids was stopped. Decannulation was achieved without disturbance.

The child however remained with a spastic hemiplegia, persistent abnormal findings on examination of the cerebrospinal fluid (25-32 cells per c.mm., and 95-140 mg.% protein) and a localized area of disturbance on the electro-encephalogram. In addition, on return to consciousness, he was found to be completely aphasic. The possible existence of a temporal lobe abscess was strongly considered, and the advisability of neurosurgical intervention hotly debated. As the child was improving steadily a conservative approach, with continued use of antibiotics, was carried out. After 130 days of treatment pneumo-encephalography showed cerebral atrophy on the left side, with a compensatory hydrocephalus. The patient was discharged with the hemiplegia and dysphasia still present.

Four months later he was readmitted with generalized convulsions, which were controlled with anticonvulsant therapy. At present the patient walks with a hemiplegic gait, and still has a marked motor and sensory dysphasia. The child is simple and euphoric. His electro-encephalogram still shows a marked disturbance over the left temporal area. Despite treatment, convulsions (often beginning with a 'gustatory phase') occur 6-10 times each month. Despite the remarkable physical improvement and the mental progress thus far achieved, the attainment of satisfactory cerebral function seems to be unlikely.

Case 2

In June 1957 a 3-year-old boy was admitted in coma. For the previous 6 months intermittent therapy for discharging ears had been given. Two days before admission the patient became apathetic after a fall, and began to vomit. This was followed by high fever and coma.

The child was seriously ill on admission, being restless, comatose, and feverish (38·2°C) and emitting now and then a high pitched 'cerebral cry'. Marked meningismus was noted. Signs of cavernous sinus thrombosis were present on the left side. There was no definite evidence of acute inflammation of the ears. Fundal examination was negative.

On lumbar puncture turbid cerebrospinal fluid under pressure was found with 1,000 cells per c.mm., Pandy test strongly positive and sugar 10 mg.%. Culture of the fluid grew pneumococci. X-rays of the skull showed a marked widening of the sutures. E.E.G. showed a severe generalized disturbance. Massive combined antibiotic therapy, similar to that used in the first case, was instituted with no effect on the clinical condition. Despite the negative findings on otologic examination, it was decided to carry out bilateral mastoidectomy. Operation on the 4th hospital day revealed a marked inflammatory lesion with pus present which was sterile on culture.

After operation the patient's coma deepened with the onset of generalized convulsions. Signs of 'secretional anoxia' became apparent, and led to tracheotomy on the 6th hospital day to avoid respiratory complications.

The patient's general condition improved with removal of the cannula after 19 further days. The child, however, remained in a state of decerebration with spasticity of the limbs, difficulty in feeding, early optic atrophy and a persistently abnormal electro-encephalogram. Pneumo-encephalography, carried out after 34 days in hospital, showed a marked hydrocephalus. Shortly afterwards the patient was discharged at the parents' request.

DISCUSSION

In considering these 2 cases, certain points are worthy of note:

1. Cavernous sinus thrombosis is a rare complication of otogenic meningitis. Infection may spread along 3 possible routes: (*a*) From the ear *via* the lateral sinus to the inferior

petrosal sinus and thus to the cavernous sinus. At mastoidectomy, however, in both cases the lateral sinus did not seem to be abnormal in appearance. (*b*) The cavernous sinus may become involved as a result of infection of the carotid plexus originating in the anterior part of the tympanic cavity near the Eustachian tube.[1] (*c*) Spread of infection may occur from the meninges to the cavernous sinus *via* the meningeal veins which communicate with the sinus.

2. With the advent of antibiotic therapy, there has been a tendency to consider otitis media as a negligible disease. Treatment has often been minimal. The first patient received one injection of penicillin for an infection of the ear, while the second child was given intermittent antibiotic therapy. A consideration of otitis media and its complications by Dysart[2] in 1956, emphasized the necessity for a thorough course of treatment for ear infections. These 2 cases show that latent otitis media does act as a 'time-bomb' with disastrous results.

3. The spread of infection from the middle ear to the meninges arouses a strong suspicion of co-existing mastoid involvement. This is especially so when the pneumococcus is the organism involved or the meiningitis does not respond to therapy as quickly as expected.[3] Under these circumstances urgent operation is of vital importance. In both cases surgery was justified by the gross inflammation found at operation, and was a factor of importance in achieving recovery.

4. In recent years it has been realized that respiratory complications are inevitable in patients with prolonged deep coma. The pharyngeal secretions which accumulate owing to the loss of the swallowing reflex, spill over into the lungs because of the absence of an efficient cough reflex, causing atelectasis, and the clinical picture of 'secretional anoxia'.[4]

Under these conditions tracheotomy is a life-saving measure allowing for an adequate air-way and the efficient removal of accumulated secretions.[5] The maintenance of a 'tracheotomy regime', for a period of 14 and 20 days respectively, in these two children, was instrumental in averting fatal pulmonary complications.

5. The presence of a purulent infection which involves the middle ear, the mastoid antrum, the meninges and the cavernous sinus, must surely affect the brain as well. The coma and the severe electro-encephalographic changes testify to the co-existent cerebral involvement. The development of localizing neurological features such as a hemiplegia or dysphasia suggests the presence of a cerebral abscess. It is, however, more reasonable to consider the condition as a supurative encephalitis without any walling-off of the inflammation. In the acute stage, therefore, neurosurgical intervention may be unnecessary, and possibly hazardous.

The subsequent development of these cases confirms the severity of the cerebral involvement. Pneumo-encephalography in both children showed evidence of gross pathology. Despite the extensive treatment, severe sequelae are present in both patients. The 1st case has been left with a hemiplegia, mental retardation, speech difficulty, and obstinate convulsions, while decerebrate rigidity is the gloomy outcome of the overwhelming infection in the 2nd case.

The results achieved cast a shadow of doubt on the advisability of an enthusiastic therapeutic regime and emphasize the necessity for an extremely guarded prognosis in all cases of this nature, despite any initial dramatic improvement.

SUMMARY

The case reports of 2 children, aged 3 and 9 years respectively, with otogenic meningitis and cavernous sinus thrombosis, are presented. Treatment consisted of massive antibiotic therapy, mastoidectomy, and tracheotomy. Both patients recovered but were left with severe neurological sequelae. The mode of spread of the inflammation, the danger of otitis media, the role of the mastoid as a focus of infection, and the importance of tracheotomy in prolonged coma, are discussed. The co-existing cerebral involvement requires that the enthusiastic therapeutic approach be tempered with a guarded prognostic assessment.

I wish to thank Dr. Y. Rotem for permission to report these cases and for his helpful criticism.

REFERENCES

1. Brunner, H. (1946): *Intracranial Complications of Ear, Nose and Throa Infections*, p. 221. Chicago: Year Book Publishers Inc.
2. Dysart, B. R. (1956): Arch. Otolaryng. (Chicago), **64**, 412.
3. Bastrup-Madsen, P. and Gregers, N. (1955): Acta med. scand., **151**, 135.
4. Taylor, R. W. (1954): Arch. Otolaryng. (Chicago), **60**, 1.
5. Lambert, V. F. (1955): Proc. Roy. Soc. Med., **48**, 947.