Meningitis and Brain Abscess Due to Clostridium Perfringens
And Clostridium Paraputricum Following Orbital Trauma

YVES GIROUARD, GILLES DELAGE,
JEAN-PIERRE MATHIEU, and ALBERT LARBRISSEAU

INTRODUCTION

Clostridium perfringens is a rare cause of meningitis or brain abscess. When it does occur, it is usually secondary to penetrating wounds of the central nervous system. Clostridium paraputricum is even less common and has rarely been implicated in human disease.

CASE REPORT

An 8 year old male caucasian sustained a 1 cm laceration of the internal portion of the left upper eyelid after being struck with a wooden tent pole. The trauma was considered minor and the wound was sutured. In the ensuing 5 hours, the patient became increasingly drowsy. He complained of headache and neck pain and he vomited. No crepitation of the wound was noted. An area of slight bulging of the sutured wound appeared. He was then transferred to Hospital Sainte-Justine.

On arrival the patient was stuporous. He had a fever of 39°C, a blood pressure of 110/70 and a pulse rate of 110/minute. The pupils were constricted. Examination of the fundi revealed venous congestion and slight bilateral papilloedema; there was a small retinal hemorrhage close to the disc. Severe meningeal irritation was present. There were also signs suggesting diffuse involvement of both frontal lobes: a sucking reflex, a rooting response, a bilateral grasp reflex and a palmar reflex. There was paresis of the left lower limb with increased deep tendon reflexes and a positive Babinski sign on that side. No crepitation of the wound was noted. An area of slight bulging of the sutured wound was incised and a small amount of nonodorous pus was obtained. Antibiotic therapy was continued; penicillin G was increased to 300,000 units/kg. Dexamethasone was added.

Computed cranial tomography (CT) done on arrival showed signs of oedema of both frontal lobes (fig. 1). A bone fragment surrounded by air was lodged in the left subfrontal lobe. Tomograms revealed a depressed fracture of the roof of the left orbit; a few bone fragments were found lying 1.5 cm over the planum.

During the first days of hospitalization, the child remained stuporous. Purposeless automatic motor activity was noted occasionally. By the 10th hospital day, there was marked improvement. The child was able to talk. The wound continued to drain. A repeat CT scan showed extension of the edema into the territory of both anterior cerebral arteries (fig. 2). Bilateral carotid arteriography revealed severe spasm of both these arteries. Air was present in the left frontal horn, and a pneumatocele was noted in the region of the gyrus rectus.

Nineteen days after admission, exploratory craniotomy was performed. A small oroventricular catheter was inserted into the left lateral ventricle. The lesion consisted of focal necrosis of the left parietal and temporal lobes. The wound was closed with a pericranial flap.

From the Department of Microbiology and Immunology and the Department of Pediatrics, Université de Montréal, and from the Infectious Diseases Service and the Neurosurgery and Neurology Services, Hôpital Sainte-Justine, Montreal, Québec.

Reprint requests to Dr. Gilles Delage, Département de Microbiologie et Immunologie, Hôpital Sainte-Justine, 3175, Chemin Sainte-Catherine, Montreal, Québec H3T 1C9

November 1981 — 309
Figure 1—Initial CT scan showing edema of both frontal lobes and a fragment of bone in the left subfrontal area.

Figure 2—CT scan 2 weeks after admission showing more extensive edema in the territory supplied by both anterior cerebral arteries.

Figure 3—CT scan 8 weeks after admission. Note the collection of subdural fluid on the left and the marked atrophy of the right frontal lobe.

Brain abscess of the inferior portion of the left frontal lobe was drained. It was noted that this abscess communicated with the ventricular system. Intracerebral bone fragments were removed; duroplasty and reconstruction of the left orbit were performed.

After the operation, the left leg weakness persisted. Behavior was inappropriate and characterised by marked disinhibition. Penicillin was stopped on the 24th day and chloramphenicol on the 34th day of therapy. Another CT scan done during the 8th week of hospitalization revealed a 1 cm thick collection of subdural fluid on the left, partial collapse of the lateral ventricle, signs of encephalomalacia of the left subfrontal region and marked atrophy of the right frontal lobe. (fig. 3). Radioisotopic cisternography demonstrated delayed circulation of C.S.F. A subdural-peritoneal shunt was performed using a very low pressure valve of the Hakim type.

At the time of discharge 10 weeks after admission to hospital neurological examination was normal except for slightly hyperkinetic and immature behavior. Two years later he was still hyperkinetic and impulsive, but was attending regular school. The CT scan was normal except for right frontal lobe atrophy.

Microbiology: two strains of strictly anaerobic sporulated gram positive rods were isolated from both the C.S.F. and the wound. They were identified as Clostridium perfringens and Clostridium paraputreficum according to standard methods. The identification of the second organism was confirmed with the use of the API-20A system for identification of anaerobes.

DISCUSSION
Meningitis due to Clostridium perfringens, with or without brain abscess, is a rare disease. It is most often secondary to severe injuries with penetrating trauma of the central nervous system (Cairns, 1947; Colwell, 1960; Ganchrow, 1971; Grashchenkow, 1945; Henderson, 1945; Møller 1955; Report 1943). Only four cases have been reported following an apparently minor injury. It occasionally complicates craniotomy or laminectomy (Alexander, 1969; Bornstein, 1964; Willis, 1964; Wright, 1966). A few cases have occurred secondary to hematogenous seeding (Conomy, 1969; Gehrz, 1976; Mackay, 1971; Sikorski, 1963). In trauma cases, crepititation suggests the development of gas gangrene and often forecasts a fatal outcome. Cases without crepitation have a much better prognosis. In our patient, the presence of intracerebral air suggested the possibility of gas gangrene. However the absence of crepitation around the wound and the fact that the patient remained relatively well with an eventual favourable outcome is not compatible with a diagnosis of gas gangrene.

To our knowledge, this is the first case report of meningitis and cerebral abscess in which Clostridium paraputreficum was isolated. This species has rarely been implicated in human disease; it has been related to the presence of gas in the portal vein (Fred, 1968; Wiot, 1961). It was also isolated from the blood of a patient with sepsis due to an infected decubitus ulcer (Rathbun, 1968). This organism is frequently found as a member of the fecal flora of normal individuals; its role in cancer of the colon is disputed at the present time (Finegold, 1975).

The intracranial complications of penetrating orbital injuries have been well described (Bard, 1964; Duffy, 1969; Dufourny, 1975 Fanning, 1976; Foy, 1980; Guthkele, 1960; Miller, 1977; Vérian, 1976). These injuries are most common in children. They are usually caused by low velocity missiles and often appear to be trivial on initial
examination. In many cases intracranial penetration is recognized only after the development of neurological complications. Fragility of the orbital roof explains the ease with which foreign bodies can penetrate the intracranial space following such trauma.

The high morbidity and mortality of transorbital injuries (particularly those involving wooden objects) dictate an aggressive approach to the care of these patients (Dujovny, 1975; Miller, 1977). Intracranial penetration must be suspected even if plain skull radiographs are normal. Surgical exploration with removal of retained foreign bodies and bone fragments, and duroplasty is indicated in every case. In our patient there was a 19 day waiting period between admission and surgical removal of the foreign body. The reasons for such a delay were twofold. On admission the neurosurgeon was impressed by the poor state of the patient and the extent of the brain swelling. Therefore, he chose to drain the superficial wound and to observe the clinical course under antibiotic therapy. Thereafter, the gradual improvement of the patient reconfirmed the attending physicians' conviction that conservative therapy was best. Surgery was decided upon after stabilization of the clinical state. We do not recommend that such an approach be taken in all cases of this type. However, in our patient it was dictated by the particular circumstances encountered, among others the delay in diagnosis of the intracranial foreign body and the presence of meningitis. Considering the foregoing facts, the outcome in this case has been unusually good.

REFERENCES


