

# FLAVOBACTERIUM MENINGOSEPTICUM INFECTIONS

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## SNYOPSIS

Isolation of *Fl. Meningosepticum* from clinical specimens has been infrequent. Being a pigment producer and a late fermenter of sugars it can be either confused with either *Pseudomonas* species or with other non fermenters.

This paper reports 6 cases of neonatal meningitis and one case of pneumonia caused by this organism and stresses the importance of correctly identifying the organism so that appropriate antibiotics will be used in sensitive testing and treatment.

## INTRODUCTION

The *Flavobacteria* are gram negative rods, nonmotile and pigment producing. The characteristic reactions are that they are oxidase positive, attack sugars oxidatively and are weakly indole positive. The organisms are frequently isolated from environmental surfaces such as water, soil and in hospitals from washbasins, sinks, humidifiers and suction pumps.

*Flavobacterium meningosepticum* has accounted for outbreaks of meningitis in newborn infants, resulting in a high mortality rate. This is due to its resistance to most antimicrobial drugs. Hydrocephalus is a common sequelae in babies who recover from the infection. In an epidemic of meningitis reported by Robert M. George in 1961, 14 babies had overt infection of which 9 died, 4 had a sequelae of hydrocephalus while only one baby recovered completely. Thirty of the babies in the nursery who were asymptomatic were found to be colonised by the organism in their nasopharynx. In one outbreak (Cabrera and Davies in 1961) the organism was isolated from fluid leaking from the sink on to a supply of cleaning materials in the nursery. In another the organism had multiplied in a pot of saline used in irrigating the infants eyes (Plotkin and Mekitrick 1966). Epidemiological studies in most of these outbreaks indicate the importance of water in the transmission of the disease (Eufroin et al in 1974). In these instances though the source of infection was traced the route of infection was not established.

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Infection due to *Fl. meningosepticum* is uncommon in adults. When an infection occurs in an adult the patient recovers completely with appropriate therapy. A case of subacute bacterial endocarditis due to *Fl. meningosepticum* was reported in an adult who had rheumatic heart disease (Seymour Werthemer et al 1972). It has caused post-operative septicaemia in 8 adults, the organism being isolated from vials containing drugs which were given intravenously during anaesthesia (Frederiksen et al 1961). All the patients recovered with no sequelae.

This paper discusses the incidence and isolation of *F1. meningosepticum* from the C.S.F. of six neonates with meningitis and the isolation of a strain of *F1. meningosepticum* from the sputum of a patient who had lobar pneumonia.

**MATERIALS AND METHOD**

The C.S.F. from these babies were found to be turbid and a gram stain from the centrifuged deposit showed a number of polymorphs and gram negative bacilli. The C.S.F. and the sputum specimens were plated on blood agar and Eosin methylene blue culture plates. The organism grew very well on both plates, and the colonies on the blood plate having a characteristic greenish colour. The colonies were strongly oxidase positive and a gram stain showed gram negative bacilli (Table 1). The identification was confirmed by agglutinating the organism with the specific antisera. Kirby Bauer technique was used in determining the antibiotic sensitivity of the isolates. Table II gives the sensitivity results of the isolates.

**TABLE I. BIOCHEMICAL REACTIONS**

Motility	—
Oxidase	+
Citrate	+
Urea	—
Nitrate	—
Indole	+ weak
Aesculin	+
Kigler	Alkaline
O/F	Oxidative
Glucose	Acid
Maltose	Acid
Mannitol	Acid
Xylose	Alkaline
Sucrose	Alkaline
Lactose	Neutral

**TABLE II. ANTIBIOTIC SENSITIVITY TESTS OF *FL. MENINGOSEPTICUM* ISOLATES**

Antibiotics	Bacterial isolates						
	1	2	3	4	5	6	7
Ampicillin 10 ug	-	-	-	-	-	-	-
Streptomycin 10 ug	-	-	-	-	-	-	-
Kanamycin 30 ug	-	-	-	-	-	-	-
Polymyxin 300 units	-	-	-	-	-	-	-
Cephaloridine 30 ug	-	-	-	-	-	-	-
Carbenicillin 50 ug	-	-	-	-	-	-	-
Chloramphenicol 30 ug	+	-	+	+	+	+	-
Gentamicin 10 ug	-	+	-	-	+	+	-
Erythromycin 15 ug	+	+	+	+	+	+	+
Novobiocin 30 ug	+	+	+	+	+	+	+

**CASE HISTORIES (Meningitis)**

Table III is a summary of the clinical histories of four of the neonates. A diagnosis of meningitis was made in all 6 cases and confirmed by laboratory tests. The babies were of low birth weight and were in the incubator, and the onset of the meningitis was after a week after the delivery of the babies in three of the neonates.

**(Pneumonia)**

A male patient of 45 years of age with a diagnosis of bulbar poliomyelitis was on a respirator. Two months after the onset of the poliomyelitis he developed continuous fever. Both the urine and the sputum were cultured and the organism isolated was reported as a pseudomonas species. The patient was treated with Gentamicin and carbenicillin and later with Amikacin with no response. A chest X'ray showed a massive pneumonia of the right lung (Fig. 1). A second sputum specimen was cultured which gave a pure growth of a gram negative non lactose fermenter which was identified as *Fl. meningosepticum*. Sensitive tests showed resistance to Ampicillin, Tetracycline, Cephaloridine, Carbenicillin, Gentamicin and polymyxin, and sensitive to Erythromycin and Novobiocin and Septrin.

**DISCUSSION**

The isolation of *Fl. Meningosepticum* from clinical specimens has been infrequent in Singapore. This could be due to the fact that the organism being a pigment producer and a late fermenter of sugars, can be confused with a pseudomonas or other non fermentive organisms.

TABLE III. SUMMARY OF THE CLINICAL HISTORIES OF THE MENINGITIS CASES

Birth Weight	Mode of Delivery	General condition at birth	Day of onset	Signs and Symptoms	Outcome
3 lb 4 oz	Normal vaginal delivery	Feeble at birth	5th day	Gastroenteritis with blood stained stools	Died
3 lb 5 oz	"	Feeble at birth	4th day	Fever and fits	Died
3 lb 15 oz	"	Fair at birth	8th day	Fever, twitches	Died
5 lb	"	Fair with chest retraction	7th day	Tense bulging	Hydrocephalus

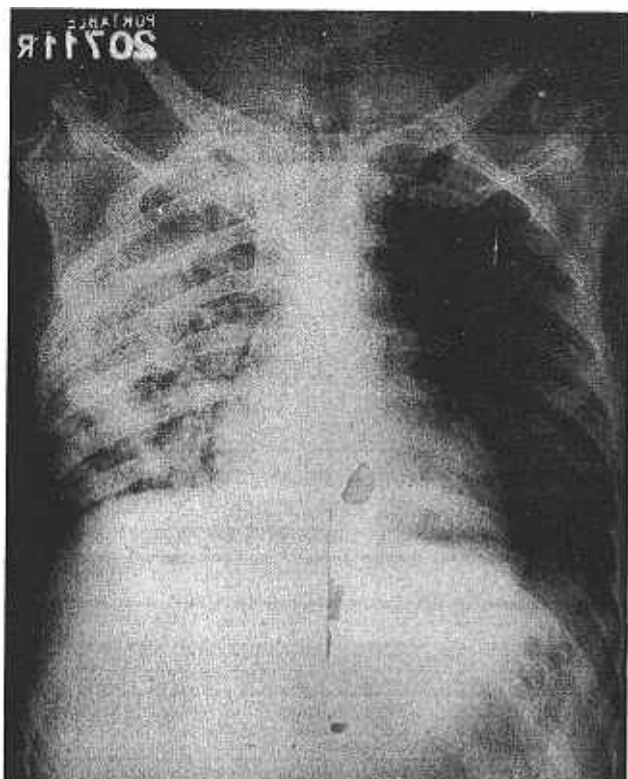


Fig. 1. Chest X'ray shows extensive pneumonia of the right lung.

The following tests are helpful in the bacterial diagnosis:- The lack of motility of the organism, the strong oxidase positive reaction, oxidative reaction in Hugh-Leifson medium and its anti-biogram which is peculiar for a gram negative organism.

The organism has accounted for epidemics of neonatal meningitis in other parts of the world. In Singapore the incidence has been sporadic about 2 to 3 cases a year, and the source of infection is not known, though it is thought to be from the humidifier of the incubators in which the babies were kept. The mortality was high, 5 out of the 6 babies died while one had a sequelae of hydrocephalus. The highly resistant nature of the organism to most antibiotics together with the poor penetration of the antibiotics into the C.S.F. may account for the high mortality.

*Fl. meningosepticum* infections have been reported by other workers in adults, but to our knowledge no known case of pneumonia due to this organism has been documented. This patient reported in this paper did not respond to treatment with gentamicin and carbenicillin though the organism isolated in the first instance was reported as a pseudomonas which was sensitive to these two drugs. It is probable the patient had a mixed infection of pseudomonas and *Fl. meningosepticum* both organisms being pigment producing and oxidase positive, the latter organism being missed in the first instance. There was dramatic improvement when the patient was treated with intravenous Erythromycin and the infection cleared in 9 days (Fig. 2). Hence the importance of identifying the organism and using the appropriate antibiotic.

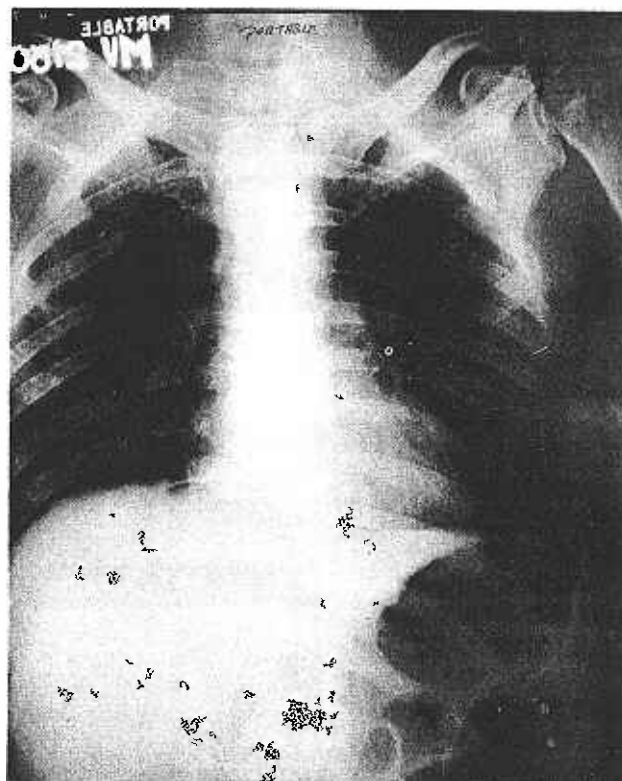


Fig. 2. Complete Resolution of the lung after treatment

The antibiogram of this organism is very peculiar for a gram negative organism. It is sensitive to antibiotics which are used in the treatment of gram positive infections. Antimicrobial susceptibility of this organism was studied by Gilardi in 1971 and he has reported that 100% of his isolates were sensitive to Novobiocin and 80% to Erythromycin, 82% to Chloramphenicol and only 35% to gentamicin. Our isolates were found to be resistant to Ampicillin, tetracycline, carbenicillin, streptomycin, cephaloridine and polymyxin. 40% of our strains were found to be sensitive to gentamicin while all isolates were sensitive to erythromycin and novobiocin. Vancomycin has been reported to be more beneficial than erythromycin and novobiocin as it is bacteriocidal while the latter antibiotics are bacteriostatic (Robert M. et al 1961). Our strains were not tested against this antibiotic. It has been stressed that these antibiotics Vancomycin, Erythromycin and Novobiocin reach the C.S.F. in small quantities hence it is important to administer the antibiotics intraventricularly to patients with meningitis in order to get adequate C.S.F. levels otherwise resistant strains may result.

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