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Haemophilus aphrophilus Infections in a Neurological Set up

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A Chandramuki ,

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, Premlatha Shankar &, Anjali Chattopadhyay,
- *Department of Microbiology, National Institute of Mental Health & Neuro Sciences, Bangalore 560 029, India*

Abstract

Haemophilus aphrophilus was responsible for seventeen cases of Central Nervous System (CNS) infections at the National Institute of Mental Health & Neuro Sciences, Bangalore in the past three years. The clinical spectra of the infections included Brain abscess (14), Meningitis (1), Ventriculitis (1) and Osteomyelitis of parietal bone (1). In 11 of these cases, H. aphrophilus was isolated as the only infective entity whereas in six of the cases the organism was isolated in association with other microbes. This report attempts to highlight the significant pathogenic role of this unusual bacterium in CNS settings.

Key words -
Brain abscess,
Meningitis,
Ventriculitis

Infections due to Haemophilus aphrophilus appear to be uncommon. The organism is most often encountered in the clinical settings of endocarditis and brain abscess [1]. Rare isolations have also been reported in clinical conditions like empyema, arthritis, septicaemia, meningitis, wound infections and osteomyelitis [2], [3]. Seventeen cases of CNS infections due to this organism were encountered at out Institution. To the best of our knowledge the association of H. aphrophilus with CNS infections has not been reported from this country. The frequent association of this organism with serious clinical conditions like brain abscess where prompt and specific chemotherapy is imperative, prompted the authors to take up the study. In the present series, the major clinical form encountered was brain abscess (14). Less commonly other infections like meningitis, ventriculitis and parietal bone osteomyelitis were also observed.

Clinical Profiles

The clinical records of 17 patients with H. aphrophilus isolation were analysed. Fourteen patients with brain abscess presented with symptoms and signs of raised intracranial tension, focal deficits and fever. Abscesses were located in the parietal (5), frontal (3), frontal parietal (1), fronto temporal (1), temporal (1), cerebellar (1) and subdural (2) regions of the brain. The clinical presentation of the two cases of meningitis and ventriculitis were with signs of meningeal irritation and fever. The solitary case of

parietal bone osteomyelitis presented with discharge of foul smelling pus following trauma. The salient clinical data and outcome of the cases are shown in Table 1.

Table I - Salient clinical data of the case

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Bacteriology

The specimens either pus or CSF were transported to the laboratory in sterile containers within 30 minutes of collection. A preliminary gram's smear of the pus or centrifuged deposit of CSF were made. Cultures were put up on blood agar, chocolate agar, MacConkey agar and fluid thioglycollate media and incubated aerobically, anaerobically (Gaspak system, BBL) and in presence of CO2.

X and V factors dependence was tested by incorporating the factor discs (Oxoid) on Mueller Hinton agar plates.

Motility, oxidase, catalase and nitrate reduction tests were done by standard methods [4] to; differentiate from closely related organisms, namely Actinobacillus actinomycetecomitans, Eikennellae corrodens and Pasturella maltocida.

Antibiogram studies were done with six of the isolates by the conventional disc diffusion technique [5].

Results

The direct Gram's smear examination of pus, revealed numerous pleomorphic gram negative rods. The CSF smears were however negative.

On chocolate agar and blood agar the colonies of H.aphrophilus were 0.5 - 1.0 in diameter, greyish, translucent, convex to dome shaped with entire edge. Growth occurred only on plates incubated in presence of CO2 or anaerobically. Six of the isolates produced slight greening of the media.

In fluid thioglycollate medium granular growth with sediment at the bottom and sides of the tubes was noted. No growth occurred on MacConkey agar plates. Fourteen of the strains showed X factor dependence but three strains were independent of X and V factors for growth. In Gram's stained smear from culture the organism showed a characteristic thumb print impression.

All strains tested were non motile, nitrate, catalase and oxidase negative. The Antibiogram of six of the isolate is shown in Table 2.

Table II - Antibiogram of the isolates (six cases)

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Six pus samples yielded a mixed flora on culture. The associated aerobic and anaerobic bacteria in these cases were Streptococcus viridans, Microaerophilic streptococci, Anaerobic streptococci, Staphylococcus aureus and Fusobacterium species.

Discussion

Sutter and Finegold [1] reviewed all the documented cases of H. aphrophilus infections. The majority of the isolations in their series, were from endocarditis and brain abscess. The CNS infections comprised of eleven cases of brain abscesses and a single case of meningitis, an overall, mortality of fifty per cent. An underlying congenital heart lesion was present in five of their cases whereas in seven cases no predisposing factors were found.

At our centre, H. aphrophilus was isolated form twenty per cent of all brain abscess pus submitted for microbiological analysis. The mortality observed was forty two per cent in our series of seventeen cases. Predisposing factors observed in the study included congenital heart disease (3), trauma (3), lung infection (2), CSOM (2) and following injection for trigeminal neuralgia (1). In six of the cases no obvious predisposing factors could be discerned. A notable feature in H. aphrophilus brain abscesses was the localisation to the parietal and frontal lobes. This was in marked contrast to the otogenic brain abscesses of mixed aerobic and anaerobic aetiology seen at out centre, where the localisation was mostly in the temporal and cerebellar regions of ;the brain.

The organism H. aphrophilus derives its name from its characteristic dependence on X factor an CO2 for growth. Many workers in recent times have not found either of these requirements to be essential [6], [1], [7]. Zinnemann, the Chairman of the Haemophilus Subcommittee for Bacterial Nomenclature has however emphasised the need for an organism to X or V factor dependent to be included in the genus Haemophilus [8]. Cowan [9] contends that it is difficult to allocate H. aphrophilus and the closely related organism A., actiononmycetecomitans, to any particular genus. In our laboratory all the strains required CO2 for growth. Fourteen of our strains were X factor dependent but three were independent of both X and V factors. The cases implicated for the equivocal results in X factor testing in the laboratory are the presence of trace amounts of X factor in many laboratory media and/or the subculture of X independent mutant colonies [8].

The organism is thought to be a normal resident flora of the upper respiratory tract and oral cavity of man [1], [7]. Dogs have also been cited as the source of infection in many of the documented H. aphrophilus infections. The organism has been reportedly cultured from the oral cavity of dogs belonging to patients with clinical infection due to this organism [11], [12]. In the present study, the source of infection could not be ascertained in all the cases. However the infection is likely to be endogenous in the cases associated with congenital heart disease, lung infection and also possibly in the post traumatic cases.

The antibiogram of the six isolates revealed a high degree of sensitivity to chloramphenicol (30 mcg). Penicillin (10 mcg) and Ampicillin (10 mcg). Resistance to tetracycline (20 mcg) and Erythromycin (15 mcg) was observed in two and three strains respectively. Sutter and Finegold [1] tested the antibiotic susceptibility of 14 strains of H. aphrophilus by the plate dilution method. All fourteen strains were found susceptible to 1.5 mcg/ml or less of Pencillin, Gentamycin, Chloramphenicol and Rifampicin.

In view of the significant isolation rate of H. aphrophilus is in CNS infections, laboratory methods should include identification procedures for this organism. The difficulties involved in identifying the organism in the laboratory, reflects lack of experience with this organism rather than technical problems in isolation [13], [14].

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