branhamella catarrhalis in acute otitis media

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For many years, the aerobic Gram-negative diplococcus”Branhamella catarrhalis” was described as a specieswithin the genus Neisseria and was known as Neisseriacatarrhalis.In 1970, this organism was transferred to a newseparate genus ”Branhamella” named in honor of a distinguishedAmerican microbiologist : Sarah Branham.The new generic name was proposed on the basisof comparison of DNAbase content between B. catarrhalisand other Neisseria species. Also, other genetic,biochemical and serologic properties support separateclassification of this organism.In 1984, Bovre reclassified B. catarrhalis asa subgenus of Moraxella. This was based on their similarguanine and cytosine base content of DNAwhich is 40-45 moles percent.Reports published during the last decade havechanged the earlier commonly held view of B. catarrhalisas merely being a harmless commensal of the upperrespiratory tract. A pathogenic role of this bacteriumhas been suggested in several types of infections includingAOM, maxillary sinusitis, bronchopulmonary infections,laryngitis, meningitis, septicemia, endocarditis andeven cellulitis. This suggested pathogenic role has beenbased on microscopic and pure culture finding only.Serological support for such pathogenic role, however,was limited to few reports.Although B. catarrhalis was thought to be uniformlysusceptible to penicillin, several studies, since 1977,have documented that clinically significant isolatesof -this bacterium were resistant to penicillin by vitrueof their ability to produce beta lactamase enzyme. Theproportion of B. catarrhalis strains elaborating thisenzyme seems to be universally increasing since 1980.Some centers are now reporting prevalence rates as highas (87%).In AOM, which is one of the most common diseasesof childhood, earlier reports indicated that B. catarrhaliswas found in the middle ear exudate of 4-9% of cases.In recent reports from several centers, after 1980, thisfigure increased to be as high as 10-27%. Serologicalstudies further supported the pathogenic role of B.catarrhalis in AOM by showing local and systemic antibodyresponses to this organism in children who had culturableB. catarrhalis in their middle ear fluids of AOM.The increasing incidence of B. catarrhalis inAOM and the emergence of beta-lactarnase-producingstrains,prompted us to determine the prevalence of this organismin middle ear fluid of children with AOM in Benha locality.Serological examination for antibodies (agglutinins)to B. catarrhalis was also done to be correlated withits isolation as an evidence for its -pathogenic- rolein such cases. Furthermore, the isolated strains weretested for beta lactamase production and, then in vitrosusceptibility testing of all isolated strains to selectedantimicrobial drugs was performed.Three hundred children (up to 12 years) of varyingage and sex, with a diagnosis of AOM were the subjectof this study.

Patients who received antibiotics withinthe previous week of their visit or who had had an episodeof otitis media during the previous month were excludedfrom the study.In bacteriological study of the middle ear fluidof these children, B. catarrhalis was recovered in 18cases (6%). Twelve (66.7%) out of these 18 isolates werein pure culture while 6 (33.3%) were mixed with otherpathogens.B. catarrhalis together withfound to be the fourth in frequencyH. influenzae were(6% for each) afterStrept. pyogenes (22%), Staph. aureus (17%) and Strept.pneumoniae (13%). Next to B. catarrhalis in frequencycame Proteus species (5.7%), E. coli (4.3 %), Pseudomonasaeruginosa (4%), Staph. epidermidis (4%), Diphtheroid(4%) and Klebsiella pneumoniae (3%). The total isolationrate of Gram-negative bacilli was (17%) while no growthwas found in 20% of cases. This may represent anae.robd,cinfection, or infection with virus, mycoplasma or chlamydiawhich we did not look for in this study.The majority (16 strains : 88.9%) of B. catarrhalisstrains isolated in this study were recovered from childrenbelow the age of 5 years. In older children (5-12 years)the organism was isolated from only 2 cases (11.1%).This may point to a developed immunity to B. catarrhalisby the age of 5 years.All cases of ADM with B. catarrhalis in this studyhad a unilateral disease, and eleven (61%) of them hadupper respiratory tract infection while, seven (39%)had lower respiratory tract infections, shortly beforethe attack of ADM. The difference between these two figuresmay reflect the importance of upper respiratory tractinfections in the etiology of AOM with B. catarrhalis.this Also, the study weremajority of .!:B co!a~t~a~r=-=.r~h~a~lo=i02.isolated during the winter strains in months (10strains 55.6%). The rate of isolation declined duringspring (2 strains only: 11.1%). No isolate was recoveredduring summer but, during autumn the rate of isolationrised again (6 strains: 33.3%). This seasonal fluctuationindicates that B. catarrhalis is most prevalent duringthe cold months of the year. This may be due to highprevalence of respiratory tract infections, especiallythose of viral etiology which may damage mucous membraneand thereby promote colonisation by B. catarrhalis. Ina similar way the absence of isolates in summer may beinterpreted as a reflection of the reduced prevalenceof respiratory infections at this time.from the clinical point of view, fourteen outof 18 cases (77.8%) of AOMwith B. catarrhal is had whitishmucopurulent discharge, while four cases only (22.2%)had mucopurulent yellowish discharge. In the latter casesB. catarrhaliS was mixed with other pathogens. Thismay indicate that AOMwith B. catarrhal is is usuallyaccompanied with whitish mucopurulent ear discharge.On the other hand, none of the patients with AOMdue to B. catarrhalis was acutely ill. Most of the patientshad fever •• 38°C with mild or moderate earache. Thismay indicate that AOMdue to B. catarrhalis is a milderdisease than that associated with other major otitispathogens.The results of the serological study in the presentwork showed a good correlation with the results ofisolation and this gave a further support to the pathogenicrole of B. catarrhalis in AOM. Antibodies (agglutinins)to B. catarrhalis were found in sera of children fromwhose middle ear fluid B. catarrhalis had been isolatedeither alone or with other pathogens. However, an increasein the antibody titers between the acute’ and convalescent·phase sera was observed only in children from whose middleear fluid B. catarrhalis was isolated in pure culture.On the other hand, antibodies to B. catarrhaliswere also found in control sera of children from whosemiddle ear fluid

bacteria other than B. catarrhalis wereisolated. However, there was no change in the antibodytiters between the acute’ and convalescent-phase seraand the overall levels were lower than in the childrenwho had otitis media with pure culture of B. catarrhalis.It is noteworthy to mention that both the presenceand the level of such antibodies were found to dependon the age of the child. In children younger than oneyear, such antibodies were undetectable in the acutephase sera, but reached reciprocal titer of 40 in, only,the convalescent phase sera of children who had AOMwithpure culture of B. catarrhalis.Out of the 18 B. catarrhal is strains isolatedin this study, 11 strains (61%) were found to be betalactamase - positive while, 7 strains (39%) were betalactamase-negative. On the basis of in vitro suscepti~ilitytests and comparison of individual and geometric meanMICs of the -antimicrobial drugs included in this study,it was found that: (1) nearly all beta lactamase-positivestrains of B. catarrhalis, in this study, were resistantto penicillin G, ampicillin and amoxycillin while, betalactamasenegative strains were susceptible to them;(2) both beta-lactamase - positive and negative strainsof B. catarrhalis in this study were susceptible to amoxycillin-clavulanate, erythromycin, cefotaxime, cephradineand TMP-SMX.These drugs showed a little change inactivities against both beta-lactamase - positive andnegative strains. So they are considered the most activedrugs in vitro; (3) the combination of clavulanic acidwith amoxycillin was very effective in vitro.It is noteworthy to mention that two exceptionswere observed in this work regarding the susceptibilityof beta -lactamase -positive strains of B. catarrhalisfor penicillin G and ampicillin. The first exceptioncomprises one strain which was susceptible to penicillinG (MIC : 1.56 mg/L) while the second comprises two strainswhich were susceptible to ampicillin (MIC .. 0.2 mg/L)•These findings may suggest that beta-lactamase productionin B. catarrhalis does not predict the degree of thein vitro sensitivity to beta-lactame antibiotics. Thesignificance of these results for the in vivo susceptibilityrequire more work to be elucidated.