

Aeromonas hydrophila: analysis of 11 cases

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A retrospective analysis of 11 cases in which *Aeromonas hydrophila* was isolated indicated that the organism caused local infection in 7 cases and asymptomatic colonization in 4. There were no cases of septicemia and none of the patients were known to have a malignant disease or immunosuppression. There were no deaths, although three of the patients required amputation of limbs because of myonecrosis. Chloramphenicol and aminoglycosides appeared to be appropriate therapeutic agents.

Une analyse rétrospective de 11 cas où l'*Aeromonas hydrophila* fut isolé montre que ce microorganisme causa une infection locale dans 7 cas et une colonisation asymptomatique dans 4. On n'enregistra aucun cas de septicémie et aucun des patients n'avait une maladie maligne manifeste ou une immunosuppression. Il n'y eut aucun décès, bien qu'une amputation de membres fût nécessaire chez trois patients à cause d'une myonécrose. Le chloramphénicol et les aminoglycosides semblent offrir une thérapie appropriée.

Aeromonas hydrophila has been reported infrequently as a cause of infection in humans. It has been associated with a variety of clinical syndromes, including necrosis of muscle, soft tissue and skin, meningitis following craniotomy, tonsillitis following dental extraction, corneal ulceration, endocarditis, infections of surgical and nonsurgical wounds, chronic otitis media, lower respiratory tract infection and cellulitis.¹⁻¹¹ Predisposing host factors, particularly for septicemia, include cirrhosis of the liver, leukemia and other forms of malignant disease and immunosuppression.^{2,7,10,12,13} Contact with water or soil often precedes infection, reflecting the aquatic habitat of the organism.¹⁴ A recent nosocomial outbreak was traced to an injury sustained in a contaminated pond,¹⁵ and the organism has been implicated in infection caused by blood transfusion.¹⁶

The following analysis of 11 cases in which *A. hydrophila* was identified at the Vancouver General Hospital since 1970 may help to define the clinical settings in which the organism may be seen in this area.

Methods and features of cases

The cases were identified retrospectively from a laboratory register of those whose specimens yielded *A. hydrophila*. The bacterium was identified by standard methods.¹⁴ All 11 isolates tested were hemolytic, motile and oxidase-positive, and 10 were indole-positive. All the isolates were gelatinase-positive and hy-

drogen sulfide-negative. Glucose, sucrose, maltose and mannitol were fermented; little gas was produced with glucose fermentation. Lactose fermentation was weak. Deoxyribonuclease was produced by the few isolates tested. In two cases the organism's identification was confirmed at the bacterial reference unit, Center for Disease Control, Atlanta, Georgia. Antimicrobial susceptibility testing was by agar disc diffusion.

Table I gives a brief account of the essential clinical features of the 11 cases.

Discussion

Several authors have reviewed the role of *A. hydrophila* in infections in humans.^{5,10,18} One group of workers classified the manifestations of *Aeromonas* infections as enteric, focal or septicemic.⁴ In the past decade, however, the spectrum of disease has been enlarged to put greater emphasis on nonenteric manifestations.

Although there is controversy regarding the pathogenetic process in the intestine,¹⁹⁻²¹ it appears that disease may be produced by cytotoxic or enterotoxic mechanisms. Differentiation between *A. hydrophila* and *A. sobria* may assist in evaluating the roles of these two bacteria as enteric pathogens.²² *A. hydrophila* is isolated from the stools of 0.2% to 3.2% of asymptomatic individuals.²³ Whether it is present there transiently or as part of the resident flora is not clear. In either event it was isolated from the pelvic abscess in case 2.

The presence of *A. hydrophila* in the mouth in case 7 does not establish a causal relation to buccal cellulitis, although the case is reminiscent of one described by Kok.³ Furthermore, *A. hydrophila* has been reported to cause disease similar to that produced by *Streptococcus pyogenes*.^{5,9} The infection in case 7 resolved quickly, but in view of the organism's universally reported resistance to ampicillin this drug is unlikely to have contributed to the recovery.

Urinary tract infection was thought not to be present in case 9 on the basis of clinical and laboratory findings, and it is likely that the isolation of the organism from the urine in low numbers (fewer than 10⁴ colony-forming units per millilitre) was due to contamination by fecal bacteria.

There is no ready explanation for the presence of *A. hydrophila* in the burn blisters of a woman who scalded her hand with boiling water (case 6).

The absence of isolates from stools in this report is explained at least in part by two factors. First, enteric bacteriologic investigation has not been performed in this hospital for some years; stools are processed in the adjacent Provincial Health Laboratories. Second, the isolation of *A. hydrophila* from stools and its identification would require special at-

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tention since this bacterium is easily confused with other nonpathogenic bacteria when stools are processed in the routine manner.¹⁸ The oxidase test is especially important in distinguishing *A. hydrophila* from bacteria that it may resemble on culture.

The four cases in which eye swabs yielded *A. hydrophila* are of interest for several reasons and have been described in detail in another report.¹⁷ First, although the organism is recognized as a potential pathogen in the eye,^{7,11} one would not, from reviewing the literature, expect it to be present in the conjunctival sacs of apparently uninfected individuals, as in cases 5 and 8. In neither of these cases did clinical infection develop, notwithstanding the presence of *Haemophilus influenzae* in case 8. However, the use of antimicrobials such as tetracycline, chloramphenicol and gentamicin as part of the routine management of these

patients may have prevented infection. Two of the patients with positive eye swabs were thought to have definite infection. Patient 3 had chronic conjunctivitis, and, although there is no proof, one can speculate on the possibility of local irritation by contact lenses or contamination of their storage solution or both as etiologic factors. Patient 4 had an ectropion following the treatment of carcinoma of the left lower eyelid 4 years earlier. This condition predisposes to chronic conjunctivitis.²⁴ Perhaps the consequent tearing afforded *A. hydrophila*, a "water bacterium", an opportunity to colonize and then infect the conjunctiva.

In this series of patients none had bacteremia, although three had extensive muscle necrosis typical of *Aeromonas* infection, with hemorrhagic necrosis and liquefaction of muscle.^{1,2} In all three cases local introduction of the organism at the time of trauma was

Table I—Clinical features of 11 cases in which *Aeromonas hydrophila* was isolated by culture*

Case no.; patient's age (yr)/sex	Clinical summary	Max. temp. (°C) and leukocyte count (× 10 ⁹ /l)	Source of <i>A. hydrophila</i>	Other bacteria isolated from lesion	Susceptibility of <i>A. hydrophila</i> †		Antimicrobial therapy†	Outcome	Follow-up findings
					S	R			
1: 9/F	Cellulitis of right foot cut on rusty knife. Severe pain, edema, loss of movement. Gas seen later. At below-knee amputation muscle was greenish-brown and gelatinous.	37.2, 25.9	Muscle	<i>Clostridium perfringens</i>	Chlor, Kana	Amp, Pen G	Chlor, Pen G, Kana	Eventual recovery	Slow recovery from encephalopathy
2: 6/F	Perforated appendix. Pelvic abscess drained per rectum.	40.2, 11.1	Rectal drainage	<i>Escherichia coli</i> , anaerobic streptococci, <i>C. perfringens</i>	Kana, Ceph, Genta	Tet, Amp	Genta	Satisfactory; discharged after 28 days	None available
3: 59/M	"Chronic conjunctivitis". Wore contact lenses.	37.0, 5.0	Eye swab	None	Tet, Sulfa, Kana, Genta	Amp, Ceph	Unknown	Unknown	None available
4: 86/F	Ectropion following treatment of carcinoma of left lower eyelid 14 years earlier. Mucopurulent conjunctivitis for 4 days before admission.	37.0, 4.4	Eye swab	None	Chlor, Tet, Kana	Amp	Chlor eye drops	Satisfactory	Uncomplicated cataract extraction 6 months later
5: 75/M	Cataract extraction. Operative swabs of eye grew <i>A. hydrophila</i> . No clinical infection.	37.4, 4.0	Eye swab	<i>Staphylococcus epidermidis</i>	Kana, Coli, Tet, Sulfa, Chlor	Amp, Ceph	Chlor eye drops; Tet, 250 mg q6h for 48 days	No infection developed	Satisfactory
6: 29/F	First-degree burn of right hand. Not infected clinically.	37.0, not done	Hand swab	<i>E. coli</i>	Tet, Ceph, Kana, Genta, Sulfa, Coli	Amp	None	Satisfactory	Satisfactory
7: 28/M	Sore in mouth with right buccal cellulitis. Large fluctuant mass; no pus. Tooth had cut cheek 1 week previously.	37.8, 6.8	Mouth	Oral flora	Not available	Not available	Amp	Satisfactory	None available
8: 8/M	Penetrating injury to eye due to straight pin. Vitrectomy and lensectomy. No infection.	37.2, not done	Eye swab	<i>Haemophilus influenzae</i>	Chlor, Genta, Kana	Amp	Genta, Chlor, Clox	Satisfactory	None available
9: 54/M	Diverticulitis. No urinary tract infection. Urine culture yielded < 10 ⁴ colony-forming units of <i>A. hydrophila</i> per millilitre.	39.6, 13.5	Urine	None	Tet, Kana, Genta, Sulfa, Nalid, Nitro	Amp, Ceph	Amp	Satisfactory	No urinary tract infection 1 year later
10: 23/M	Motorcycle accident. Thrown into ditch. Multiple injuries. Lacerated foot amputated by Syme's operation. Brown liquefaction of muscle.	38.4, 12.4	Muscle	<i>E. coli</i> , <i>Enterobacter cloacae</i> , <i>S. aureus</i> , <i>Enterococcus</i> , <i>Pseudomonas aeruginosa</i>	Tet, Kana, Genta, Sulfa, Chlor	Amp, Ceph, Ticar, Carb	Pen G, Ceph	Satisfactory	Satisfactory
11: 19/M	Leg lacerated by motorboat propeller in fresh water lake. Myonecrosis. Amputation.	37.8, 10.7	Muscle	None	Tet, Chlor, Kana, Sulfa, Nitro	Amp, Ticar, Carb	Pen G, Genta	Satisfactory	Satisfactory

*Cases 3, 4, 5 and 8 have been described in detail elsewhere.¹⁷

†S = sensitive to; R = resistant to; Amp = ampicillin; Carb = carbenicillin; Ceph = cephalothin; Chlor = chloramphenicol; Clox = cloxacillin; Coli = colistin; Genta = gentamicin; Kana = kanamycin; Nalid = nalidixic acid; Nitro = nitrofurantoin; Pen G = penicillin G; Sulfa = sulfonamide; Tet = tetracycline; Ticar = ticarcillin.

more likely than systemic spread from another focus. The extent of the lesions in these patients was in keeping with the view that the organism appears to be particularly damaging to skeletal muscle.⁴ Case 11 highlights this point since *A. hydrophila* was the only bacterium seen in or isolated from the lesion. One of these three patients (no. 10) did not receive effective antimicrobial therapy, and his recovery is attributable to surgery.

The absence of immunosuppression or liver disease in this series of patients is at variance with the experience of others.^{2,10,13,25,26} It is not due to patient selection since such individuals form a significant proportion of the patient population served by the laboratory. The absence of bacteremia in this series may also explain the fact that ecthyma gangrenosum²⁶ was not detected.

In keeping with the observations of others,⁵ bacteria other than *A. hydrophila* were also isolated from the lesions in 7 of the 11 cases.

Another point of interest is that asymptomatic colonization with no evidence of infection was identified in four of the cases.

The antibiotic susceptibility patterns of the isolates was in keeping with those described previously.^{3,5,7} All of the isolates were susceptible to chloramphenicol and the aminoglycosides, and one was resistant to tetracycline, a phenomenon noted by others.^{5,7,27} Susceptibility to the cephalosporins was variable, and the only two isolates tested against ticarcillin and carbenicillin were resistant. All the isolates were resistant to ampicillin.

It is gratifying that all the patients in this series survived their infection, although those with muscle necrosis suffered severe infection and amputation of limbs. This relatively good outcome may reflect the absence of patients with chronic liver, renal or malignant disease in the series. The response to treatment was generally satisfactory, and chloramphenicol and aminoglycosides appear to be appropriate therapeutic agents.

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