Clinical and Laboratory Characteristics of Invasive *Aeromonas* Infection in a UK Teaching Hospital: A 20-year Retrospective Review

S Motukupally & N Perera, University Hospitals of Leicester NHS Trust

Introduction

Aeromonas species are facultative anaerobic gram-negative bacilli that inhabit aquatic environments. They are a recognised cause of self-limiting diarrhoeal disease in humans. Invasive infections are increasingly recognised amongst patients with underlying diseases such as hepatobiliary disease, malignancies and other immunocompromised conditions. *A hydrophila* is the most common species causing infections in humans. Increasing resistance to βlactam antibiotics is being recognised, posing therapeutic challenges.

Aim

Define the epidemiology, clinical and laboratory features, treatment and clinical outcomes of laboratory confirmed invasive *Aeromonas* infections over a period of 20 years.

Methods

All *Aeromonas* isolated between 1998 and 2018 were retrieved from the laboratory database and were filtered to include invasive infections.
All available clinical records for each patient were reviewed to gather relevant information.
In all cases *Aeromonas* were isolated by BacT/ALERT® automated blood culture system and were identified by either API-20NE or MALDI-TOF.
Antimicrobial susceptibility testing was performed by standardised disc diffusion method and interpreted according to BSAC criteria.
Clinical records were available for review in only 40 patients.
The source of invasive infection was determined based on clinical, radiological and laboratory findings.

Results

During the 20 year period a total of 44 patients were identified to have an invasive *Aeromonas* infection.
Samples included blood cultures (41), ascitic fluid (2) and peritoneal dialysis fluid (1). The average number of invasive *Aeromonas* infections / year were two (range 1-11). There is an increase in the number of infections over the years with 75% of infections occurring in the last decade (Fig 1).
The clinical, laboratory characteristics and antibiotic susceptibility are shown in Table 1, 2, 3 & 4.
Aeromonas hydrophila was the most common species isolated.
Most common source of infection was the hepatobiliary tract with underlying calculi, malignancy or cirrhosis.
Resistance to amoxicillin and amoxicillin-clavulanic acid was high.
33 patients received treatment with appropriate antibiotics, whilst 11 patients also needed surgical intervention. 7 patients died before initiation of treatment.

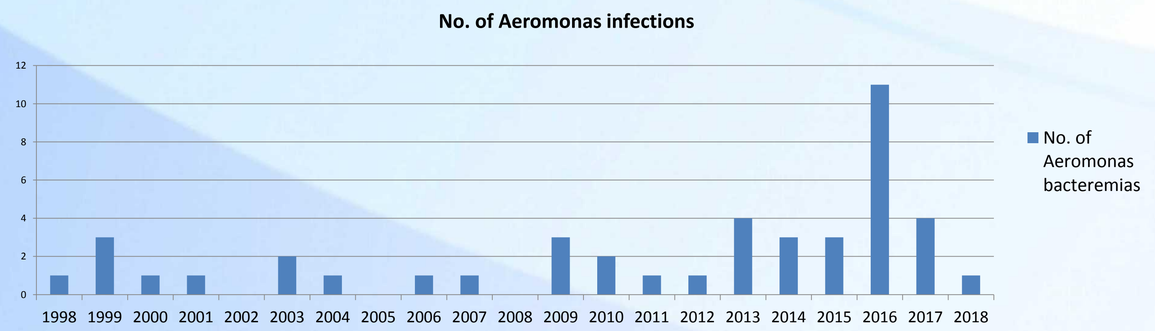

Fig 1: Incidence of Aeromonas infections over 20 years

Clinical characteristics	No (%) of patients
Age (n=44)	
<15 years	4 (9)
40-65 years	15 (34)
>65 years	25 (57)
Sex (n=44)	
Male	24 (55)
Female	20 (45)
Source of infection (n=44)	
Primary bacteraemia	10 (25)
Secondary bacteraemia	30 (75)
Not known (no clinical details)	4
Source of infection (secondary bacteraemia) (n=30)	
Hepatobiliary	19
Line related	7
Drowning	2
Pneumonia	1
SBP	1
Underlying co-morbidities (n=40)	
Active malignancy	15
Diabetes	7
Inflammatory bowel disease	3
Alcoholic liver disease	2
Bowel surgery	3
Polycystic kidney disease	1

Table 1: Clinical characteristics of patients with *Aeromonas* infections

Laboratory characteristics (n= No. of pts tested, No. of pts with a raised value, mean value)	
Raised C-reactive protein (n=35)	35, 129.55
Raised White blood cell count (n=40)	24, 14.17
Raised Alkaline phosphatase (n=41)	25, 315.36
Raised Alanine transaminase (n=41)	22, 150.43
Raised Total bilirubin (n=41)	25, 39.80

Table 2: Laboratory characteristics of patients with *Aeromonas* infections

Aeromonas species isolated (n=44)	No (%)
A hydrophila	27 (61)
A sobria	7 (16)
A veronii	1 (2)
A species	9 (21)
Polymicrobial infection	21 (48)

Table 3: *Aeromonas* species isolated from patients

Antimicrobial	Total isolates tested	S	I	R	% S
Amoxicillin	40	1	-	39	2.50
Amoxicillin-clavulanic acid	30	11	-	19	36.66
Cefotaxime	41	39	-	2	95.12
Ciprofloxacin	42	41	-	1	97.61
Gentamicin	42	41	-	1	97.61
Piperacillin+Tazobactam	37	34	-	3	91.89
Meropenem or Imipenem	42	40	1	1	95.23

Table 4: Antibiotic susceptibility results of *Aeromonas* isolates

Discussion

Despite an increase in the number of infections over the years, compared to published literature the number of *Aeromonas* infections were low. This may reflect low exposure to the organism compared to developing countries.
Similar to published literature, diseases of the hepatobiliary tract were the most commonest predisposing factors for invasive *Aeromonas* infections. Overall the susceptibility patterns of *Aeromonas* isolates were in keeping with published data. Most isolates were sensitive to 3rd generation cephalosporins, piperacillin-tazobactam, quinolones and carbapenems. However a few studies have reported resistance to these classes of antibiotics too.

Conclusions

This study adds strength to the existing literature, the increased predisposition to *Aeromonas* infections amongst patients with diseases of the hepatobiliary tract. The increasing resistance to amoxicillin-clavulanic acid among isolates may pose treatment failure. A more pragmatic approach would be to switch to a more appropriate antibiotic if a laboratory identification of invasive *Aeromonas* infection is available and avoid increasing mortality and morbidity.

References

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s.motukupally@nhs.net