

**Case Report / Olgu Sunumu**

## **A Case of Total Knee Arthroplasty in which *Aeromonas Hydrophila* Was Isolated in Perioperative Culture**

*Perioperatif Kültüründe Aeromonas Hydrophila Üreyen Total Diz Artroplastisi Yapılan Bir Olgu*

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*Aeromonas hydrophila* is a bacterium, which is found in ambient water and primarily causes gastroenteritis in humans. In recent years, *Aeromonas* strains have been reported to cause a variety of extraintestinal infections such as ocular, respiratory, urinary tract infections. The extraintestinal infections are usually rare. However, it is pointed that these bacteria can also be a cause of prosthesis infection after a total knee prosthesis operation in the represented case. In this report, a 73-year-old female patient was represented who had been operated twice because of prosthesis infection in another hospital and still has knee ache and purulent discharge at the incision site. In the perioperative bone and soft tissue cultures, *A. hydrophila* was isolated and it was shown that these bacteria could be the cause of prosthesis infection except known rare causes. In this case, it was emphasized that more than one perioperative bone and soft tissue cultures should be obtained to increase the chance for definitive diagnosis in prosthesis infection.

**Key words:** *Aeromonas hydrophila*; prosthesis infection; perioperative culture; arthroplasty.

*Aeromonas hydrophila* insanlarda çoğunlukla gastroenterit yapan ve sularda bulunan bir bakteridir. Son yıllarda *Aeromonas* türlerinin oküler, deri ve yumuşak doku, solunum sistemi ve üriner sistem infeksiyonu gibi çeşitli intestinal sistem dışı infeksiyonlara neden olduğu bildirilmektedir. İntestinal sistem dışı infeksiyonlar nadirdir. Bununla birlikte sunulan olguda bu bakterinin total diz protez ameliyatı sonrası protez infeksiyonu nedeni olabileceği gösterildi. Bu bildiriye başka bir hastanede iki kez protez ameliyatı geçiren, hala ağrı ve pürülan akıntısı olan 73 yaşında bir bayan hasta sunuldu. Ameliyat sırasında alınan kemik ve yumuşak doku kültürlerinde *A. hydrophila* izole edilen olguda, bu bakterinin protez infeksiyonunun bilinen nadir etkenleri dışında protez infeksiyonu nedeni olabileceği gösterildi. Bu olguda protez infeksiyonlarında kesin tanı şansını artırmak için ameliyat sırasında birden fazla kemik ve yumuşak doku kültürünün alınması gerektiği vurgulandı.

**Anahtar sözcükler:** *Aeromonas hydrophila*; protez infeksiyonu; perioperatif kültür; artroplastisi.

*Aeromonas* species are oxidase-positive, gram-negative bacilli found in fresh or brackish water. They are members of the family Aeromonadaceae and inhabitants of aquatic ecosystems including groundwater and chlorinated tap water at treatment plants and in distribution systems as hos-

pital water supplies or reservoirs as well as lakes and rivers. In addition, these species are also found on a variety of vegetables, fish, meat and dairy products as raw milk, ice cream. Although 14 strains of Aeromonadaceae species have been reported until now, only three strains have been

clinically important. These species are *Aeromonas hydrophila*, *Aeromonas caviae* and *Aeromonas veronii biovar sobria*.<sup>[1]</sup> The most common clinical manifestations are gastrointestinal system and soft tissue infections. In recent years, *Aeromonas* strains have been reported to cause a variety of extraintestinal infections such as ocular, respiratory, urinary tract infections. To our knowledge, there were 38 reports on *Aeromonas* spp found in Pubmed from our country by using *Aeromonas* and Turkey keywords on July 22, 2008. In these reports, *Aeromonas* species were isolated from different animals (chicken, Nile crocodile, rainbow trout, etc.) and drinking water. Among these reports human cases were very rare.<sup>[2,3]</sup> There was no report to access indicating that *A. hydrophila* can cause extraintestinal infections on human from our country in Pubmed. However in the present case, it is pointed that these bacteria can also be a rare cause of prosthesis infection after a total knee prosthesis operation.

### CASE REPORT

A 73-year-old female patient had undergone right total knee prosthesis due to osteoarthritis

in another hospital. Following the operation, purulent drainage and ache was noted on the operation site in the first postoperative week. In the same center, she was operated twice (debridement with device retention and removal of prosthesis after two weeks from debridement) and was given antimicrobial therapy (teicoplanin, 1x400 mg IM, linezolid 2x600 mg IM, fucidic acid 3x500 mg) which was prescribed without periprosthetic tissue culture. Despite the antimicrobial treatment she had to be transferred to the department of orthopedic surgery of our hospital, with complaints of worsening knee ache and purulent discharge at the incision (Fig. 1). Her preoperative examination and tests revealed that she was afebrile with the accompanying laboratory findings; white blood cell count 12000  $\mu$ L (normal range 4000-10000  $\mu$ L), C-reactive protein 33.4 mg/L (normal range; 0, 1-8, 2 mg/L), erythrocyte sedimentation rate 49 mm/h (normal range; 0-20 mm/h) liver function tests and serum creatinine level were normal. There were no further underlying diseases including diabetes mellitus, malnutrition, liver cirrhosis, renal insufficiency, etc. Antimicrobial therapy was replaced with ampicilline-sulbactam 4x1.5 gr IV empirically. There were no bacteria isolated in blood culture. Twenty-four hours after admission, she was operated for deb-



Fig. 1. Patient at the time of admission. The prosthesis had been removed and replaced by an antibiotic-loaded spacer.



Fig. 2. After the second debridement performed by us.



Fig. 3. After the last debridement. Note that the volume of the spacer increased in subsequent debridements.

ridement and *A. hydrophila* was isolated in the perioperative bone and soft tissue cultures three times (Fig. 2). Susceptibility of the isolate was routinely studied by using the disc diffusion method. This bacterium was resistant to piperacillin-tazobactam, ceftazidime, ciprofloxacin, carbapenem but was susceptible to amikacin and gentamicin. Her antimicrobial therapy was changed to piperacillin-tazobactam 4x4, 5 g/day and amikacin 1x1 gr/day. Minimal Inhibitory Concentration (MIC) of ceftazidime, piperacillin-tazobactam and amikacin was determined by E test according to Clinical Laboratory Standards Institute (CLSI) recommendation.<sup>[4]</sup> The MICs for ceftazidime and piperacillin-tazobactam and amikacin were 256 mg/L, 256 mg/L and 4 mg/L respectively. After two weeks of antimicrobial therapy, she was reoperated for debridement and irrigation during which four tissue samples were obtained for tissue culture (Fig. 3). There were no bacteria found in the perioperative culture. Her clinical condition recovered with no further complaints. Accordingly, the new laboratory findings were; white blood cell count 7100/mm<sup>3</sup>, C-reactive protein 3.4 mg/L, erythrocyte sedimentation rate 42 mm/hour in the sixth week following antimicrobial therapy. Her treatment was completed in the eighth week, and the case was followed without antibiotic during the next three months. Then, a revision total knee



Fig. 4. Final radiogram with stemmed knee prosthesis.

arthroplasty operation was performed (Fig. 4). At this final stage the patient had no complaints and she could walk without help. Accordingly, this present report describes arthroplasty infection due to *A. hydrophila* in a case that has been under control for four months.

## DISCUSSION

Intestinal and extraintestinal infections caused by *A. hydrophila* have been reported in humans. Several reports have notified this distinct group of bacteria as a causative agent of diarrhea, wound infection, soft tissue infections, hemolytic uremic syndrome, pancreatic abscess, osteomyelitis, spontaneous bacterial peritonitis, nosocomial bacteremia, meningitis, endocarditis, suppurative thrombophlebitis, etc.<sup>[1,5-7]</sup> In an article, reporting thirty-eight cases with extraintestinal infections evaluated, eleven cases were diagnosed as skin and soft tissue infections but none of these cases was prosthesis infection.<sup>[7]</sup> In Pubmed, we have not been able to track any case of knee prosthesis infection by *A. hydrophila*. In the present case, in the perioperative bone and soft tissue cultures, *A. hydrophila* was isolated three times and all of these strains had the same susceptibility pattern; it was shown that these bacteria could be the cause of prosthesis infec-

tion among the other known rare causes. In this case, the infection was probably facilitated with multiple operations performed in the same area. It was considered that *A. hydrophila* penetrated to the prosthesis region by means of trauma as a facilitative factor. This is in line with the view that the risk factors for *A. hydrophila* infection were injuries causing direct contact with contaminated water, soil or presence of foreign bodies.<sup>[8]</sup>

It has been reported that *A. hydrophila* was uniformly resistant to penicillin and ampicillin, often resistant to cefazolin and ticarcilin, usually sensitive to aminoglycosides and variably susceptible to piperacillin, carbapenem, third-generation cephalosporins, aztreonam.<sup>[1]</sup> In a study carried out by Sader and Jones,<sup>[9]</sup> it was determined that *A. hydrophila* was MIC >64 mg/L for piperacillin-tazobactam, 8 mg/L amikacin and ≤2 mg/L for ceftazidime. In the presented case, MIC was found 256 mg/L for piperacillin-tazobactam and ceftazidime, 4 mg/L for amikacin. Due to the standard MIC value for *A. hydrophila* in the Clinical and Laboratory Standards Institute (CLSI) table, the MIC values of this case were resistant to piperacillin-tazobactam and sensitive to amikacin.<sup>[4]</sup> In the presented case, antimicrobial treatment was combined with piperacillin-tazobactam and amikacin because of extraintestinal *Aeromonas* infections are usually polymicrobial (50%). Accordingly, the debridement and antibiotic treatment were successfully accomplished.

In conclusion, prosthesis infection rate is less than 2% in primary replacement surgery; however, this rate reaches up to 40% in surgical revision.<sup>[1]</sup> In addition to increase of infection

possibility, microorganisms causing the infection may also change in the consecutive procedures. These reasons emphasize that more than one perioperative bone and soft tissue cultures should be obtained to increase the chance for definitive diagnosis. Especially in the cases with no clear response to treatment, it should be considered that *A. hydrophila* can be a cause of total knee prosthesis infection.

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