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(CASE REPORT)

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Rare case report: Perforation Gallbladder Peritonitis Caused by *Enterococcus avium* at Prof. Dr. I.G.N.G Ngoerah Hospital

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Abstract

Enterococcus is a gram-positive, catalase-negative, and non-spore-bearing bacteria that generally live in the digestive tract of humans and animals. *Enterococcus avium* has rarely been detected infecting humans. *Enterococcus avium* has low virulence and is an opportunistic pathogen in hosts with weakeness immune systems. The most frequently reported sites of entry are the biliary tract and stomach. Peritonitis caused by *Enterococcus avium* is rare. Infection generally occurs through bacterial colonization. We report the first case of a patient with Gallbladder perforation resulting in peritonitis caused by *Enterococcus avium* at Prof. dr.I.G.N.G Ngoerah Hospital.

Case Presentation: A 67-year-old Balinese man with peritonitis due to gallbladder perforation caused by infection *Enterococcus avium*. Previously the patient complained of stomach pain, and the patient had a history of gallstone disease. Subsequently, surgery was performed on the patient. During the operation, pus and perforation of the gallbladder were found. The pus specimen was examined in the microbiology laboratory, and the *Enterococcus avium* bacteria was identified as a significant agent causing the infection. In this case, ampicillin was recommended as therapy. After 5 days of antibiotics, the patient's condition improved.

Conclusion: *Enterococcus avium* has low virulence and is an opportunistic pathogen in an immunocompromised host. The finding case will be beneficial to clinicians because it provides additional information about the lesser-known *Enterococcus avium.*

Keywords: *Enterococcus avium*; Peritonitis; Gallbladder perforation; Ampicillin; Case Report

1. Introduction

Enterococcus is a gram-positive, catalase-negative bacterium that does not have spores that usually inhabit the digestive tract of humans and animals[1]. *Enterococus* is known as an important human pathogen, and its ability to inherit or acquire determinants of antibiotic resistance is a global health problem that results in significant morbidity and mortality[2,8]. Morbidity and mortality associated with *enterococcus* infection still reach 20-40% despite advances in antimicrobial therapy over the last few decades*. Enterococcus* is also a common nosocomial pathogen. To date, approximately 58 different *enterococcus* species have been identified[3].

Enterococci faecalis and *Enterococci faecium* are the most common and cause a variety of infections in humans including bacteremia, endocarditis, urinary tract infections, intra-abdominal infections, cellulitis, and wound infections[3,6].

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Enterococcus avium is also a member of the genus *Enterococcus*, and this species is known to live in the digestive tract of birds there is some evidence that this species is present in small numbers in the human digestive tract[4]. *Enterococcus avium* are known to cause infections in humans rarely.

Approximately 45-65% of cases of peritonitis are caused by gram-positive organisms, most of which are *coagulase-negative staphylococcus*. *Enterococcus spp* causes 4% of cases of peritonitis[4]. *Enterococcus spp* is generally found in humans' intestinal and urinary tract flora[5,7]. But they can also be the main pathogens that cause urinary tract infections, bacteremia, and nosocomial infections that are resistant to antibiotics[7,8]. In particular, *Enterococcus avium* is an agent with low virulence and rarely causes serious disease[1,4]. We present a case where peritonitis occurred due to rupture of the Gallbaladder, and *Enterococus avium* was the primary cause.

2. Case Illustration

A 67-year-old man came to the hospital complaining of abdominal pain. Initially, the stomach pain is felt in the pit of the stomach, then it spreads to the entire stomach area. The pain is said to persist like being stabbed. This complaint was accompanied by nausea and vomiting twice, a history of defecation (+), flatus (+), fever (+), decreased appetite and drinking, and significant weight loss (-). From the examination, the patient appeared weak, with blood pressure of 90/60 mmHg, Heart rate: of 113 x/minute, Respiratory rate: of 27 x/minute, and temperature on arrival of 36.3^{0}C. Physical examination of the head, thorax, and extremities was found to be within normal limits. Abdominal examination revealed distension bowel sounds 2-6x/minute, tenderness throughout the abdominal area, muscular density, and no tympanic sounds. From the rectal toucher examination, it was found that the was (+) strong, the ampulla of the recti had not collapsed, the mucosa was smooth (-), there was no mass, and feces were found on the handscone, there was no blood mucus. Laboratory examination found WBC 18.25, HB: 9.5 gr/dl, Neutrofil%: 15.66%, Ureum: 45.9 mg/dl, Creatinine Serum: 3.81 mg/dl, SGOT: 21.00 U/L, SGPT: 23.00 U/L, total bilirubin 0.70 mg/dl, direct bilirubin: 0.44 mg/dl, indirect bilirubin: 0.26 mg/dl. From the BOF examination of 3 positions, the following picture was found:

Figure 1 BOF: Sentinel loop Part of the cistern of the small intestine in the upper right region accompanied by decreased distribution of intestinal gas, can be a picture of an inflammatory process

Based on the anamnesis, physical, and supporting examination, the patient was diagnosed with sepsis, peritonitis et causa perforation of the gallbladder, and ACKD et causa suspect prerenal on CKD suspect nephrotic syndrome. Next, laparotomy adhesiolysis surgery was performed. During the operation, 500 cc of pus, slough, and perforation of the gallbladder were found. Gallstones were found in the gallbladder. Then a cholecystectomy is performed to separate the gallbladder from the liver. Samples in the form of gallstones were sent to the clinical pathology laboratory for gallstone analysis. The results showed that the gallstones consisted of mineral and organic materials. The bile tissue was sent to the anatomical pathology laboratory, and a picture of suppurative xanthogranulomatous inflammation accompanied by perforation was obtained. Then the sample in the form of pus is sent to the microbiology laboratory. In the microbiology laboratory, gram staining, culture of specimens, identification, and antibiotic sensitivity testing are carried out.

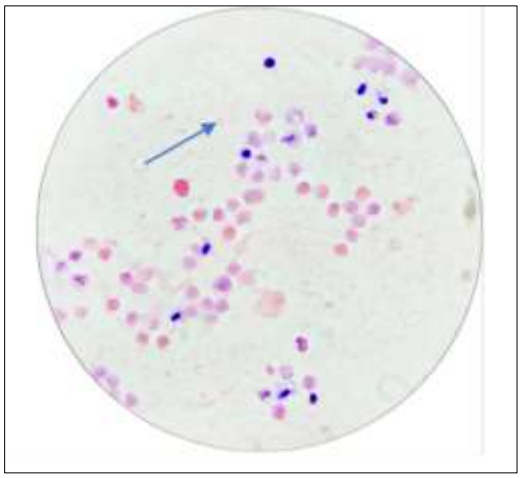

Figure 2 Gram stain showing gram positive cocci bacteria from a pus specimen at 100 X magnification

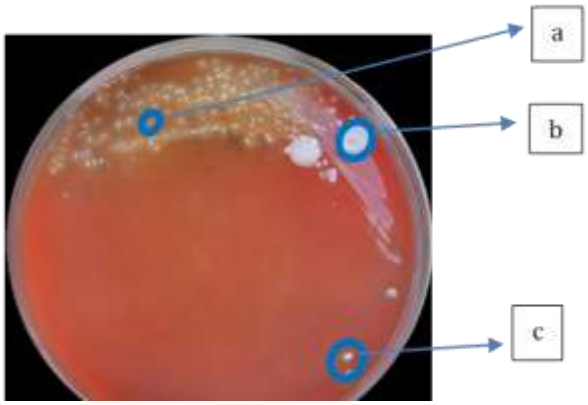

Figure 3 Image of colonies on blood agar media

On the blood agar (fig.3), 3 colonies were found, Colony (a) a small round colony which underwent hemolysis and grew up to quadrant I. After gram staining, at 100 x magnification, gram-positive cocci bacteria were found with a negative catalase test. Colony (b) is a large white, non-hemolytic colony that grows up to the second quadrant. After gram staining at 100x magnification, gram-negative rod bacteria were found. Colony (c) is a round white alpha hemolysis colony growing to the third quadrant. After carrying out gram staining at 100x magnification, gram-positive cocci bacteria were found with a negative catalase test. Then sub-culture was carried out on colony (c) because it grew dominantly up to the third quadrant on blood agar.

Figure 4 Sub culture of alpha hemolytic round white colonies

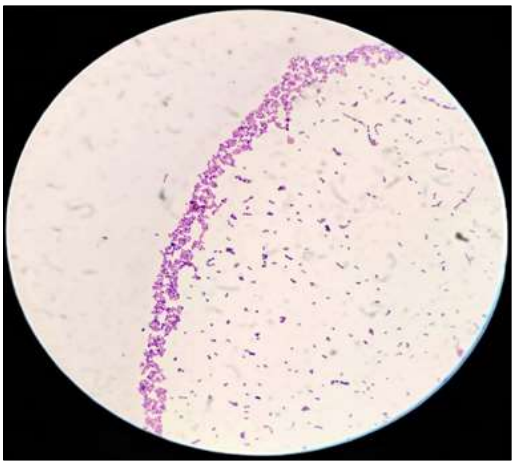

Figure 5 Colonies taken from the subculture showed positive Gram cocci bacteria at 100X magnification

After subculturing, pure (c) colonies were obtained (Fig.4). After gram staining of the subcultur colony, at 100x magnification, gram-positive coccus with negative catalase were found (Fig.5). The identification and AST (sensitivity test) were carried out using a Vitex Compax 2 machine. After identification, *Enterococcus avium* was found with a probability of 94%. With these results, it was concluded that it was significant as an agent causing infection. In this case, the recommended antibiotic is ampicillin. After 5 days of antibiotics, the patient's condition improved.

3. Discussion

The *enterococcus* consist of gram-positive coccus which are natural inhabitants of the intestinal tracts of humans and animals[9]. The commonly identified species in clinical specimens are *E. faecalis* and *E. faecium*. Other species such as *E durans, E avium, E casseliflavus, E gallinarum,* and *E raffinosus* are observed occasionally[7]. All species produce the cell wall-associated group D antigen in the Lancefield classification system. Most *enterococcus* are nonhemolytic or α hemolytic, although some strains show β hemolysis. *Enterococcus* sometimes exhibit a pseudo-catalase reaction with weak bubbling in the catalase test. Identification of the species level is based on biochemical characteristics. In contrast, *streptococcus* can grow under extreme conditions for example, in the presence of bile or 6.5 % Nacl or at 45^0 C or alkaline pH. The ability of *enterococcus* to hydrolyze PYR is useful for differentiating them from group D *streptococcus*[3].

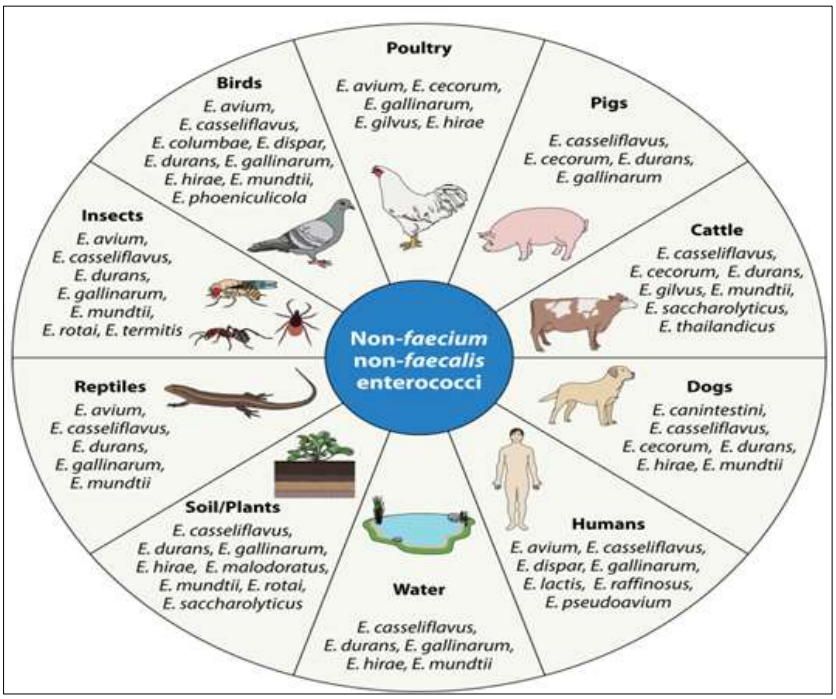

Figure 6 The host/environments from which *enterococcus* are most frequently isolated

E. avium was first identified in 1955 from human feces. It was initially placed in the *Streptococcus* genus as *E. avium* (so named because most isolations came from chicken feces). Subsequent studies revealed its prevalence in the feces of mammals such as dogs, pigs, and humans at about 20%. The species is principally found in low abundance in the GI tract of poultry and mammals (including humans). *Enterococci avium* has low virulence and is an opportunistic pathogen in an immunocompromised host[2]. The bacterium colonizes in the gastrointestinal and genitourinary tract, and the mode of transmission could be from contamination of devices or translocation from the colonized body sites[2,8]. Most of the case reports or series that had been reported in the literature have severe gastrointestinal diseases[1,4,6]. They are often associated with other gastrointestinal organisms, and infections tend to be polymicrobial. *E. avium* has been isolated from the blood and bile of immunocompetent hosts with acute cholecystitis before. *E. avium* has been reported to cause bacteremia, meningitis, endocarditis, and intra-abdominal infections. *E. avium* rarely causes peritonitis, but only a few cases have been reported so far as per the review of the literature[4,6].

An important risk factor for *E. avium* is contact with animals especially birds as it has been commonly isolated from chicken feces[8,9]. However, our patient did not have a history of eating raw chickens or contact with chickens or domestic animals. The most commonly reported site of entry is the biliary tract and abdomen. The site of entry in the present case did not appear to be the biliary tract or the intestines, as there was no elevation of transaminases or bilirubin. In this case, the previous history of cholecystitis was unknown, but the patient had a history of cholelithiasis. Infection generally occurs due to colonization in the gastrointestinal tract, which is supported by the patient's comorbid factors (old age, history of CKD, cholelithiasis), indirectly decreasing the immune system. *E avium* infection is reported to occur frequently in immunocompromised patients who experience bacteremia. Although *Enterococcus* inhabits the gastrointestinal tract as a commensal, certain predisposing conditions may allow this organism to invade extra-intestinal regions and cause infections. The ability of the organism to acquire newer traits makes it more virulent enabling it to colonize newer areas in the host and cause infection[2]. It is not a single factor responsible for the organism's virulence. Several studies have identified different virulence factors, most important among them being hemolysin, gelatinase, *enterococcus* surface protein, aggregation substance (AS), MSCRAMM Ace (Microbial surface component recognizing adhesive matrix molecule adhesin of collagen from Enterococcus), serine protease, capsule, cell wall polysaccharide and superoxide[3,8].

Enterococcus avium is readily identified by the routine blood and body fluid culture. Commonly used media to identify *Enterococcus* species include bile esculin agar and 6.5% salt broth. Species identification techniques include VITEK 2 automated system, matrix-assisted laser desorption/ionization-time of flight (MALDI-TOF), polymerase chain reaction (PCR) for specific genes, 16S rRNA sequencing, and proprietary multiplexed nucleic acid amplification. *Enterococcus avium* is susceptible to most antibiotics, differentiating it from *E. faecalis and E. faecium,* which tend to be resistant to them[4,7]. Antibiotics that are still sensitive according to CLSI include ampicillin, cefazolin, cefotaxime or ceftriaxone, amoxicillin-clavulanate, ampicillin-sulbactam, piperacillin-tazobactam, gentamicin, ciprofloxacin, levofloxacin and trimethoprim-sulfamethoxazole. This is in accordance with this case, where the patient was advised to administer ampicillin.

Abbreviations

- CLSI: Clinical and Laboratory Standards Institute;
- ACKD: Acute on Chronic Kidney Disease;
- CKD: Chronic Kidney Disease;
- AST: Antimicrobial Susceptibility Testing: Gram Negative;
- PYR: Pyrrolidonyl Arylamidase;
- MALDI TOF: matrix-assisted laser desorption/ionization-time of flight;
- PCR: Polymerase Chain Reaction.

4. Conclusion

Enterococcus avium has low virulence and is an opportunistic pathogen in an immunocompromised host. The bacterium colonizes in the gastrointestinal and genitourinary tract. In this case, *Enterococcus avium* infection can cause gallbladder perforation, resulting peritonitis. Infection from these bacteria can occur due to colonization and be accompanied by comorbid diseases in the patient. *Enterococcus avium* is susceptible to most antibiotics.

Compliance with ethical standards

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Disclosure of conflict of interest

The authors state that this study was conducted without any commercial or financial ties that could be seen as a possible conflict of interest.

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Statement of informed consent

The author has obtained informed consent from the patient and the doctor treating the patient regarding this case report.

Author contribution

Ni Made Primasari Dewi contributed to the study conception and design and drafted the manuscript. Ida Sri Iswari revised the manuscript critically for important intellectual content. Ni Made Primasari Dewi and I Komang Weka performed the main part of the data collection and interpretation of the patient's data. Anak Agung Indra Yulyastuti assists in the data collection process.

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