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Liver abscess and sepsis caused by *Clostridium perfringens* and *Klebsiella oxytoca*



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ABSTRACT

INTRODUCTION: *Clostridium (C) perfringens* and *Klebsiella (K) oxytoca* are pathogenous human bacteria. Due to the production of several toxins *C. perfringens* is virulent by causing i.a. the necrotizing fasciitis, gas gangrene and hepatic abscess. *K. oxytoca* mostly causes infections of the respiratory and gastrointestinal tract.

PRESENTATION OF CASE: We are presenting the case of a male patient at the age of 64, who suffered from nausea and progressive pain in the right upper abdomen. A computer tomography of the abdomen revealed a 7 × 5,6 cm sized entrapped air in liver segment VII. Later the patient developed a multiorgan failure. We then performed an explorative laparotomy. Intraoperatively it became clear that the liver was destructed presenting an open liver abscess (LA) cavity of segment VII. The gallbladder was found inflamed. We successfully conducted the consistent debridement of segment VII and removed the gallbladder. Microbiological examination isolated *C. perfringens* and *K. oxytoca*. The patient survived undergoing antimicrobial and multimodal sepsis therapy.

DISCUSSION: The LA is a severe disease in surgery. In literature an overall mortality of 6–14% is described. Mostly bacterial infections of the biliary tract and the gallbladder are responsible for a LA. Abscesses with sepsis caused by both, *C. perfringens* and *K. oxytoca*, are highly perilous but rarely described in literature. **CONCLUSION:** When diagnosing an LA caused by *C. perfringens* an immediate surgical debridement and antimicrobial treatment is mandatory for the patient's survival.

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1. Introduction

C. perfringens is a gram-positive spore-forming and rod-shaped anaerobic bacillus tolerating up to 3% O₂ [1]. Belonging to the family of *Clostridiaceae*, it was first described by Andrewes and Klein in the 1890s. This bacterium is grows rapidly, showing a doubling rate of 7 min [2]. *C. perfringens* can be found everywhere in nature and is a component of the human intestinal and genital tract. Its virulence depends on the toxin production. The main toxin is the phospholipase C (α toxin). It damages the structural integrity of the cell membrane by splitting lecithin of the cell membrane into phosphocholine and diglyceride. This leads to hemolysis [1]. Furthermore the phospholipase C initiates platelet aggregation and ischemia due to microvascular occlusion by activating the platelet glycoprotein receptor IIB and IIIA [3]. The virulence factors β-, ε- and t-toxin are acting on the vascular endothelium and causing a capillary leak [1]. By inoculating of clostridial spores into necrotic tissue *C. perfrin-*

gens causes a necrotizing fasciitis, gas gangrene, hepatic abscess, emphysematous cholecystitis, emphysematous gastritis as well as an emphysematous cystitis and necrotizing enterocolitis [3]. *C. perfringens* can be responsible for food poisoning [4].

K. oxytoca is a gram-negative aerobic. Though but facultatively anaerobic, non spore-forming, non-motile bacterium and belongs to the family of *enterobacteriaceae*. *Klebsiella* species can be found everywhere in the environment. It was first isolated by Flugge in 1886 [5]. By direct and indirect contact of contained persons and objects *K. oxytoca* causes infections of the respiratory and gastrointestinal tract with a consecutive sepsis [6]. Due to the synthesis of Beta-lactamase this bacterium has the potential of being resistant to penicillin and ampicillin. Also resistances of *Klebsiella* strains against colistin and carbapenems have been found [7,8].

Some authors postulate that *K. oxytoca* is responsible for up to 8% of the cases of acute pneumonia [6]. Especially immunocompromised patients suffer fatal infections caused by these bacteria.

The work in this case has been reported in line with the SCARE criteria [9].

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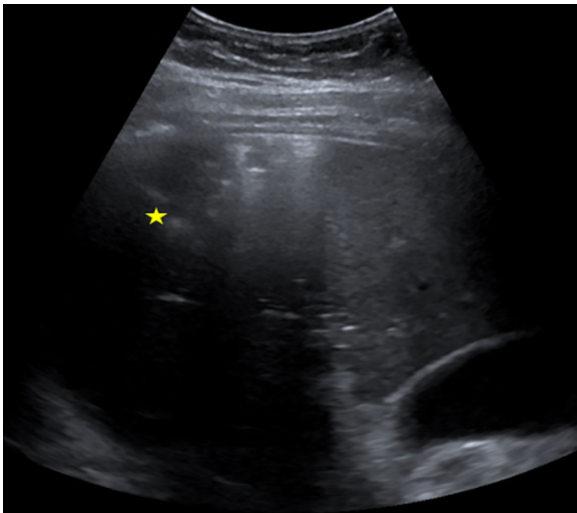


Fig. 1. Ultrasound imaging of the liver. A 7 × 6 cm sized lesion surrounded by air in the right lobe of the liver became evident (marked by the yellow star).

2. Presentation of case

Caucasian male patient, 65 years of age, was referred to our hospital. For approximately 24 h he had been suffering from pain in the right shoulder, the right upper abdomen, nausea and vomiting. The day before he had consumed alcoholic drinks, but denied an alcoholic abuse strictly. The medical history includes hypothyroidism, diabetes mellitus type II, arterial hypertension, a chronic obstructive pulmonary and coronary heart disease. Furthermore he underwent a Billroth-II-resection due to stomach ulcer disease 30 years ago. During the clinical examination the patient showed a positive murphy sign. Laboratory test revealed increased concentrations of the C-reactive protein, leucocytes, procalcitonin and liver enzymes such as bilirubin, transaminases and gammaGT. The abdominal ultrasound and computer tomography detected a 7 × 5,6 cm sized entrapped air in the liver segment VII, air in the bile duct system, an abscess formation in the right liver lobe and an inflamed gallbladder with a three-layer wall (Figs. 1 and 2). The puncture of the abscess was successfully conducted. Moreover we performed an oesophagogastrroduodenoscopy including an endoscopic retrograde cholangiography. In spite of several attempts the *papilla vateri* could not be intubated because of a subdermal emphysema. While treated in the intensive care unit, the patient subsequently developed a sepsis failure with a respiratory insufficiency and a renal failure. A long term ventilation via tracheostomy and a temporary conducted dialysis was mandatory. After presenting the patient to surgery an interdisciplinary consensus decided to perform an explorative laparotomy, with the aim to drain the abscess as a major point in treatment of anerobic gas-producing bacterized abscess. Intraoperative findings revealed a liver that was moth-damage-like-destroyed and an opened abscess cavity of the liver segment VII. The abscess formation was connected to the right pleura space and was treated by placing a pleura drainage. Approximately 4 l of bloody ascites had to be withdrawn by suction. We removed the inflamed gallbladder and conducted a debridement of the liver segment VII (Fig. 3). The microbiological examination of the removed gallbladder and liver tissue isolated *Klebsiella oxytoca* and *Clostridium perfringens*. *Klebsiella oxytoca* could only be cultivated in the blood sample. Additionally to the surgical treatment, including two scheduled laparotomies, the patient received antibiogramm suitable antibiotics and intensive care therapy. Fortunately after four weeks the patient was discharged without any residual symptoms.

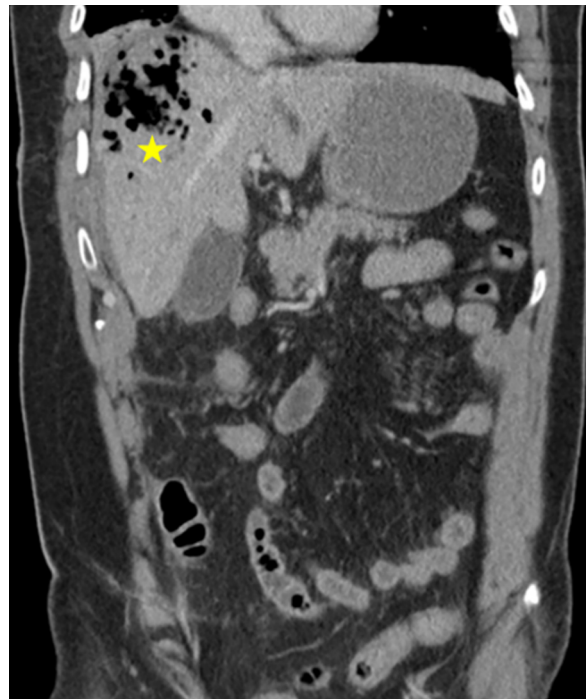


Fig. 2. Computer tomography of the abdomen. The right hepatic lobe shows a 7 × 6 cm sized area of low attenuation containing mostly air (marked by the yellow star).

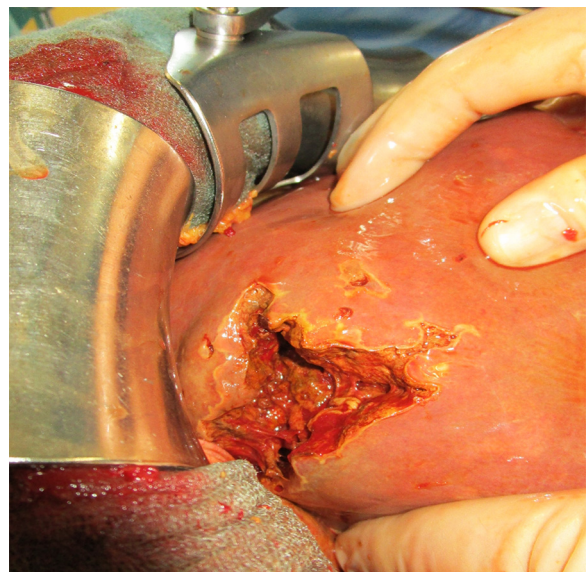


Fig. 3. Intraoperative imaging of an opened abscess cavity in the liver segment VII.

3. Discussion

The LA is a severe disease in surgery with an overall mortality of 6–14% [10]. Hansen et al. performed a 10-year population-based retrospective clinical of LAs reaching 9% of the Danish population. They identified an LA incidence of 11 in 1,000,000. Most times infections of the biliary tract and the gallbladder just like in the case report at hand are responsible for LAs [11]. Chen et al. conducted a retrospective analysis of 72 patients, who suffered from a LA. Alcoholism, diabetes mellitus and bile stones were the main underlying diseases [12].

The LA is caused by different organisms. The most common pathogens are bacteria – mostly *Escherichia coli*, *Staphylococcus*

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