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Case Series: Herein, we presented two cases of multiloculated, large liver abscesses in critically ill patients treated successfully by CT-guided drainage and antibacterial therapy.

Conclusion: We strongly suggested that in critically ill patients with large and multiloculated liver abscesses such clinical management might be an effective option of treatment strategy.

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CASE SERIES

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Keywords: Multiloculated liver abscesses, Percutaneous drainage, Colonic perforation, CT-guided drainage

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INTRODUCTION

Pyogenic liver abscess continues to be a fatal illness in gastrointestinal, surgical, and critical care fields. Despite modern diagnostic technologies and minimally invasive therapeutic strategies, it is still associated with high morbidity and mortality rates [1, 2]. Moreover, it might rapidly progress to severe critical illness complicated by shock and multiple organ failure significantly worsening patient's outcome [3]. The cornerstone of clinical management is based on appropriate antimicrobial therapy and interventional radiology (needle aspiration, percutaneous catheter drainage) [4]. Surgery still remains a main therapeutic approach in cases of large, multiloculated abscesses and concomitant intra-abdominal surgical problems [4, 5]. In this report, we describe two clinical cases of large, multiloculated liver abscesses in severe critically ill patients.

CASE SERIES

Case 1: A 68-year-old male has been transferred to our intensive care unit (ICU) from the emergency room after two weeks of fever (38.7 °C), progressive fatigue, and vomiting. His medical history included: hypertension, heavy smoking and non-obstructive coronary artery disease treated by micropirin, ACE-inhibitors and diuretics.

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The patient was admitted to ICU in severe septic shock (systolic blood pressure < 80 mmHg, tachycardia > 130 bpm, fever 39 °C, lactate > 3 mmol/L) followed by acute renal failure (urine output 10–20 mL/h, (creatinine 225 µmol/L, urea 66 mmol/L) and respiratory distress (respiratory rate > 30 breaths/min, PO₂/FiO₂ 182). Slight abdominal distension and liver enlargement were observed in physical examination. Immediately after initial resuscitation and initiation of broad-spectrum antibiotic therapy (metronidazole and cefuroxime), the patient underwent total body computed tomography (CT) scan which revealed a large (10x9 cm), multiloculated liver abscess in right lobe and small foreign body in the sigmoid colon (Figure 1A–B).

Laboratory findings of the patient were remarkable for white blood cell count 21000/µL, neutrophils 94%, and aPTT-60.6 s, INR 2.1.

The patient was transferred to the operating room and underwent urgent explorative laparotomy, sigmoidectomy, and colostomy. No surgical intervention with the liver abscess was performed. The patient was transferred to the ICU for further care. The CT-guided percutaneous drainage of the abscess was performed over next 48 hours twice (the second, for repositioning of the drain). A large amount of purulent fluid was drained, and cultures demonstrated positive growth of *Bacteroides fragilis*. After ten days, drainage was removed. Antibiotic therapy was adjusted according to sensitivity to ciprofloxacin and metronidazole and continued for at least seven weeks. Pathological examination of resected sigmoid has shown small chicken bone with evidence of perforation and local inflammatory tissue reaction. One month following his admission the patient was discharged, fully recovered, from the ICU.

Case 2: An 85-year-old female initially presented to surgical ward with severe abdominal pain, fever (39°C), nausea and vomiting. She was hemodynamically stable with no evident respiratory distress. On physical examination her abdomen was slightly distended. Her past medical history included: hypertension, diabetes mellitus type II and *chronic obstructive pulmonary disease* (COPD).

Contrast CT scan of abdomen showed large (8.5x9 cm), multilocular abscess in segment VII–VIII of right hepatic lobe and multiple diverticulosis of colon with small amount of fluid in pelvis (Figure 2). The patient underwent emergent percutaneous CT-guided needle aspiration. Twenty milliliters of pus was drained and sent for Gram stain and culture. However, during next 48 hours she progressively developed septic shock (sinus tachycardia 116 beats/minute, systemic blood pressure 89/51 mmHg, lactate >2 mmol/L, pH 7.17) and multiple organ failure (urea 108 mmol/L, creatinine 110 µmol/L, PO₂/FiO₂ 93, INR1.5). The patient was admitted to our ICU. Laboratory findings revealed white blood cell count 27000/uL, neutrophils 95%.

Broad-spectrum antimicrobial therapy was initiated with third generation cephalosporin and metronidazole.

Figure 1: (A) Contrast computed tomography scan showing large, multiloculated abscess in right liver lobe, (B) Small foreign body (chicken bone) in sigmoid with suspected colonic perforation.

Figure 2: Abdomen contrast CT imaging of 85-year-old female showing a large (8.5x9 cm) multiloculated hypodense findings in right hepatic lobe (abscess).

Computed tomography (CT) scan was repeated initially after admission to ICU and demonstrated unchanged multiloculated process in the same segments of right hepatic lobe. Thus, CT-guided percutaneous drainage was performed (Figure 3). Both bacterial culture samples after needle aspiration and catheter drainage showed up positive *Bacteroides fragilis* growth. The patient continued the catheter drainage over next two weeks and antibiotic therapy at least five weeks. Following the drainage, she demonstrated remarkable clinical improvement. Her subsequent intensive care unit hospitalization course was uneventful.

DISCUSSION

In the last two decades, cholelithiasis and biliary tract pathology have become the primary etiology of pyogenic liver abscess. More rarely, liver abscesses develop secondary to appendicitis, diverticulitis (colonic disease only) and colonic perforation after ingestion of foreign bodies. Pyogenic liver abscess related to foreign bodies in gastrointestinal tract is a well-known clinical entity. It has been described after ingestion of fish, chicken bones and toothpicks [6, 7]. Despite the difference of etiologic factors, the common clinical features are similar and usually include: right upper quadrant (RUQ) pain, fever, anorexia, and fatigue. Some patients complicated by severe sepsis/septic shock with multiple organ failure require intensive care. Overall mortality rate in intensive care units is about 28% [3]. Microbial cultures in most cases are polymorphic (Streptococcus group, Gram negative pathogens, *Bacteroides* species, etc.) [7, 8].

In Case 1, a large, multiloculated liver abscess developed after ingestion of a chicken bone and subsequent perforation of the sigmoid colon. In Case 2, the presence of liver abscess is believed to be associated with multiple diverticulosis of the same part of colon. In this case CT scan did not show any evidence of colonic perforation. Both patients developed a typical clinical picture with evidence of septic shock complicated by multiple organ failure (renal, hematologic, and respiratory). Clinical diagnosis was supported by microbiological studies positive for *Bacteroides fragilis* growth in pus of both patients. The initial management of liver abscess in both the patients was based on long-term antimicrobial therapy (seven and five weeks subsequently) and CT-guided percutaneous drainage only. No other surgical intervention was needed during hospital stay. This clinical approach is considered the mainstay of care of pyogenic liver abscess in most surgical wards over the world.

However, in contrast to our clinical findings, Glick et al., Hope et al. and Heneghan et al. [4, 6, 9] reported the urgent surgical intervention requirements in case of a large (>3 cm) and multiloculated pyogenic liver abscess. Hope et al. [9] found in a retrospective study of 107 patients a failure rate of 77% with systemic antimicrobial therapy and percutaneous drainage only. They conclude

Figure 3: Percutaneous CT-guided catheter drainage of liver abscess in right lobe.

that initial open surgery approach has a higher success rate in cases of large, complex and multiloculated liver abscesses. Moreover, Chung et al. [10] supported these debates by stating that percutaneous drainage failure might lead to uncontrolled and fatal sepsis. Finally, Chen et al. [3] failed to find a difference in outcome of critically ill patients with pyogenic liver abscess in relation to treatment options. In a retrospective paper of 72 critically ill patients with liver abscesses they did not find in outcomes between patients treated by drainage and antibiotics, and primary surgery and antibiotics only.

In both of the cases presented here, we achieved a complete clinical response after initial percutaneous drainage and antibacterial treatment. These findings support the feasibility of this strategy in critically ill patients.

CONCLUSION

In the presence of sepsis and multiple organ failure, additional liver surgery might be an independent

and serious risk factor contributing to morbidity and mortality. Thus, percutaneous drainage might be an optional and safe procedure also in cases of large and multiloculated pyogenic liver abscesses.

Author Contributions

Evgeni Brotfain – Substantial contributions to conception and design, Acquisition of data, Drafting the article, Revising it critically for important intellectual content, Final approval of the version to be published

Leonid Koyfman – Substantial contributions to conception and design, Acquisition of data, Drafting the article, Revising it critically for important intellectual content, Final approval of the version to be published

Amit Frenkel – Substantial contributions to conception and design, Acquisition of data, Drafting the article, Revising it critically for important intellectual content, Final approval of the version to be published

Leibowitz Akiva – Acquisition of data, Analysis and interpretation of data, Drafting the article, Revising it critically for important intellectual content, Final approval of the version to be published.

Kutz Ruslan – Substantial contributions to conception and design, Acquisition of data, Drafting the article, Revising it critically for important intellectual content, Final approval of the version to be published

Alexander Zlotnik – Substantial contributions to conception and design, Acquisition of data, Drafting the article, Revising it critically for important intellectual content, Final approval of the version to be published

Moti Klein - Substantial contributions to conception and design, Acquisition of data, Drafting the article, Revising it critically for important intellectual content, Final approval of the version to be published

Guarantor

The corresponding author is the guarantor of submission.

Conflict of Interest

Authors declare no conflict of interest.

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