World Journal of Advanced Research and Reviews
eISSN: 2581-9615 CODEN (USA): WJARAI
Cross Ref DOI: 10.30574/wjarr
Journal homepage: https://wjarr.com/

(CASE REPORT)

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Intra-abdominal abscess with *Candida* in a post-operative setting

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World Journal of Advanced Research and Reviews, 2023, 18(01), 783–786

Publication history: Received on 20 January 2023; revised on 13 April 2023; accepted on 15 April 2023

Article DOI: https://doi.org/10.30574/wjarr.2023.18.1.0211

Abstract

The goal in this case report is to discuss one presentation of the microbiology of the *Candida* species in an intra-abdominal abscess which is under reported. In general, the *Candida* species fungi is a common yeast found human beings as part of the microbiology. Common sites of candidiasis are often the oral cavity or the genitalia. *Candida* species have been found to have a mutualistic relationship with different species with the body [5]. When overproduction of *Candida* species occurs, it can cause pathological infections in patients. While it is common to see patients with *Candida* species in their gut micro biome, it is not well documented to have intra-abdominal abscesses that grow *Candida* species. Typically, bacterial causes are first on the differential for clinicians. This case presentation looks to discuss some of presenting factors seen in intra-abdominal candidiasis (IAC) and what leads to it being under diagnosed.

Keywords: *Candida*; Abscess; Abdominal; Hernia; Operative; Surgery

1. Introduction

Intra-abdominal abscesses are collections of pus or infected fluid within the peritoneal cavity. They are often caused by a number of different associated conditions including but not limited to diverticulitis, appendicitis, or surgery. Patients can often suffer from fever, abdominal pain, nausea, vomiting and changes in bowel movement. Patients are most commonly treated with antibiotics and, depending on size and location of abscess, percutaneous or surgical drainage. The common microbiology found in intra-abdominal abscesses includes *E. coli* and other coliforms, *Streptococci*, *Enterococci* and other anaerobes [7]. It is also possible to have fungal infections as well. *Candida* species can be found with patients who are high risk like those who are immunocompromised, have a prolonged hospital stay, or have recurrent infections [6]. Post-surgical patients are at higher risk for these fungal infections [2]. Like in this patient, fluconazole or micafungin are often used to treat *Candida* infections.

2. Case Presentation

A 50-year-old woman with a history of type 2 diabetes mellitus presented to the emergency department with abdominal pain and hyperglycemia after not taking her home medications for two weeks. Her blood sugar on arrival was 723 mmol/L with elevated BUN and creatinine. Her pain was described as sharp, periumbilical, and radiated throughout her abdomen, and she had associated nausea and vomiting. A computed tomography (CT) scan of the abdomen and pelvis at the time showed a paraumbilical hernia containing multiple loops of small bowel resulting in obstruction, with fluid and fat stranding in the hernia sac. The hernia was reduced at bedside by general surgery with immediate improvement in her symptoms. Patient needed medical optimization prior to surgery with concerns for diabetic ketoacidosis due to extremely high blood glucose. Her urinalysis on admission also showed bacteria, yeast, blood, leukocyte esterase, and nitrites. She was given fluconazole for the yeast revealed with the urinalysis. Her white blood cell count was elevated at 14 x10^9/L on admission but was down-trending. On day 7 of this hospital admission, the patient went to surgery for release of an incarcerated ventral hernia.

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The patient had not had a bowel movement in the two weeks she had been hospitalized and had developed a leukocytosis which peaked at 15.3 x10^9/L; a repeat CT of the abdomen/pelvis was ordered, and blood cultures were drawn. The CT showed inflammatory changes and cellulitis of the right lower abdominal wall and dehiscence of the midline suprapubic scar, significant inflammation of the hernia sac with moderate enteritis and fluid interloop fluid with no definite pneumatosis, diffuse colitis of the mid-transverse colon long segment stricture, and mild rectosigmoid colitis, as well as a right anterior abdominal wall rectus abdominis muscle hematoma. Blood cultures were positive for gram positive anaerobic cocci in chains. She was started on cefepime 1 gram every 8 hours, metronidazole 500 mg every 8 hours, and vancomycin 500 mg daily. Infectious disease was consulted for further evaluation, they agreed with management and added micafungin 100 mg daily for fungal coverage. One week later, the cefepime and metronidazole were discontinued, and meropenem 500 mg every 8 hours was added while continuing the vancomycin and micafungin. Following blood cultures were negative for any growth.

On hospital day 22, the patient's white blood cell count was up-trending, reaching 26.7 x10^9/L, the highest it had been during her admission. Thereafter, a repeat CT abdomen/pelvis was ordered, which showed five extraluminal fluid collections with enhancing wall indicating possible abscesses. One was bilobed extending into the hernia measuring 7.5 x 4.1 x 15 cm, two were in the left lower quadrant 6.4 x 4.2 x 4.9 cm, and 4.2 x 6.6 x 8.5 cm respectively, one was subphrenic 5.3 x 3.3 x 1.6 cm, and the fifth was in the pelvic region of cul-de-sac 5.2 x 2.6 x 5.2 cm. At this time, the patient had finished a two-week course of meropenem and micafungin, and another course of meropenem was started with 500 mg every 8 hours. Five days later, a repeat CT abdomen/pelvis showed multiple intraperitoneal fluid collections with dependent high-density material suggesting blood products versus dilute water-soluble gastrointestinal contrast; general surgery was re-consulted for concern for perforated bowel. Interventional radiology was also consulted for drain placement. A CT-guided pigtail drain was placed into the ventral hernia abscess, and cultures were sent to pathology. Culture of peritoneal abscess revealed moderate gram-positive flora growth, as well as *Candida albicans* moderate growth and *Candida dubliniensis* moderate growth. Blood cultures were negative for growth at the same time, though urine culture did grow *Candida albicans* as well. Patient was started on fluconazole, but then transitioned to micafungin due to elevated transaminases.

On hospital day 33, a repeat CT abdomen and pelvis showed a significant decrease in fluid collection in the right lower quadrant ventral hernia, while the other fluid collections on the left side and mid-abdomen remained relatively unchanged. Patient remained on meropenem and micafungin for multiple weeks. While hospitalized her most recent CT abdomen/pelvis showed a hematoma where the pigtail drainage catheter was, increased size of collection of fluid and gas in the ventral abdominal wall along the inferior aspect of the hernia sac, concern for fistulation with bowel though not clearly demonstrated and concern due to increased size and extensive gas, and the small peripherally enhancing fluid collections along the left paracolic gutter and fluid collection extending superiorly from larger abdominal wall were stable from prior images. A WBC scan showed focal increased white blood cell accumulation within the anterior right abdominal wall hernia sac corresponding with the fluid and gas collection seen on CT consistent with wall abscess.

General surgery was consulted, but no plans were made for procedural intervention in light of the patient's status as a poor surgical candidate. A second general surgeon was consulted for another opinion, and they advised starting total parenteral nutrition and keeping the patient no oral intake except meds. Patient was eventually started on a clear liquid diet, which was advanced as tolerated. Plans were made for discharge to a skilled nursing facility with continuation of intravenous micafungin 100 mg every day and intravenous meropenem 500 mg every 8 hours on discharge.

3. Discussion

Intra-abdominal candidiasis (IAC) is but just one type of deep-seated candidiasis, which, unlike candidemia, constitutes a more involved infective process than simple fungemia. While IAC shares many of the conventional risk factors with its bloodstream-focused cousin, epidemiology, scope of variance in clinical presentations, and precise delineation of disease parameters continue to elude further characterization and understanding [1]. Prior investigations have identified repeated perforations of the gastrointestinal system, leakage of anastomoses, abdominal drain, and courses of antifungal or antibiotic therapy lasting longer than a week as likely risk factors for IAC, especially in the critically ill [2]. Additional risk factors are likely to be identified as studies into deep-seated candidiasis and IAC progress. What is understood about IAC is that it presents a considerably elevated mortality risk for patients when compared to those without it [3]. This disposition towards increased mortality along with all that remains unknown about IAC underscore the importance and urgency of its further characterization.

In this case report, we described the detection of an intra-abdominal abscess that returned positive for *Candida*. Congruent with previously discussed ambiguities in determining precise disease definitions as well as undetermined clinical variances, the patient was found to have IAC only when abscess cultures revealed as such; identification purely

based on clinical phenotype would have likely led to delayed detection, if at all, with presumably significantly poorer outcomes. Notably, while *C. albicans* has long been known as the predominant *Candida* species, the patient's cultures also returned positive for *C. dubliniensis*, a species with a unique affinity for HIV patients [4]. Also significant was the presence of some of the described risk factors for IAC, specifically a prolonged course of antifungal and antibacterial therapy as well as the presence of abdominal drainage [2]. It is our opinion that the patient had additional, and as of yet uninvestigated, factors that may have presented an increased predisposition for IAC; among these were type 2 diabetes mellitus with severe hyperglycemia, constipation, underlying abdominal/gastrointestinal pathology in the form of an incarcerated hernia, and acute kidney injury. Future studies of deep-seated candidiasis and IAC may identify new risk factors by evaluating for any inter-condition trends or relationships among these.

Concomitant with the growing threat of antimicrobial resistance, *Candida* infections have globally been shifting to involve more nonalbicans variants and have also exhibited increasing resistance to established antifungal modalities [4]. While this troubling trend can certainly be attributed in part to poor antimicrobial stewardship, insufficient usage of these same agents has also been implicated [4]. Further investigations of deep-seated candidiasis are, as such, urgently warranted for proper and timely diagnosis, which necessarily precedes treatment and strategies for prophylaxis.

4. Conclusion

Although less commonly identified than candidemia, deep-seated candidiasis forms may represent a greater than expected proportion of all *Candida* infections [4]. The risk for greater mortality with IAC and the wider shift to increased resistance present appreciable impetus for greater interest and focus on the subject. In this clinical vignette, we described a hospital course noteworthy for IAC that corroborated just some of its few known risk factors and features. Our case report also outlined additional avenues for novel studies through which IAC and deep-seated candidiasis may come to be better understood and defined. Improved outcomes with invasive candidiasis are likely to result with fruition of further studies into all forms of *Candida* infections.

Compliance with ethical standards

Acknowledgments

The views expressed in this publication represent those of the author(s) and do not necessarily represent the official views of HCA Healthcare or any of its affiliated entities.

Funding

This research was supported (in whole or in part) by HCA Healthcare and/or an HCA Healthcare affiliated entity. The views expressed in this publication represent those of the author(s) and do not necessarily represent the official views of HCA Healthcare or any of its affiliated entities.

Disclosure of conflict of interest

The above listed authors have no conflicts of interest to declare.

Statement of informed consent

Informed consent was obtained from all individual participants included in the study.

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