Emphysematous Cystitis in a Patient with a Left Ventricular Assist Device

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Abstract

Background: Emphysematous cystitis (EC) is an infection of the lower urinary tract by gas-producing pathogens leading to the accumulation of gas within the wall or the lumen of the bladder. Emphysematous cystitis is rare and is known to occur more frequently in immunocompromised or diabetic patients.

Methods: We report an exceptional case of EC of a female patient after left ventricular assist device (LVAD) implantation.

Results: Sustained maintenance on LVAD is associated with an increased frequency of infections. Some infections of this type may be related to the decrease in cellular immunity that is described following LVAD implantation.

Conclusion: Patients with LVAD are believed to be immunocompromised with greater risk of developing EC.

EMPHYSEMATOUS CYSTITIS is a rare infection of the lower urinary tract, which occurs more frequently in patients with diabetes mellitus. Sustained maintenance on LVAD is associated with an increased frequency of infections that could be related to the alterations in cellular immunity following LVAD implantation. We report an exceptional case of EC in a female patient after LVAD implantation.

Case Report

A 58-year-old female was hospitalized for confusion and abdominal pain. Six years prior to this hospital admission, she suffered from a non-Hodgkin lymphoma (NHL) and had been treated with chemotherapy. Subsequently, she was considered cured. She developed a refractory cardiomyopathy that was considered to be secondary to anthracyclin. In order to bridge heart transplantation, a LVAD was implanted. Three weeks later, she was hospitalized for abdominal symptoms. Her physical examination was unremarkable. The laboratory investigations showed an inflammatory syndrome, *Escherichia coli*, and *Klebsiella pneumoniae* isolated from urinary culture. Her glucose blood level remained normal. The computed tomography (CT) scan was suggestive of EC showing pneumatosis within the bladder wall (Fig. 1). No urinary tract obstruction or renal parenchyma abnormality was

found. She was treated using a tri-anti-biotherapy intravenously for four weeks, followed by oral bi-anti-biotherapy for two weeks, in association with bladder drainage. She rapidly recovered and her symptoms resolved within 15 days. The patient did not present any other urinary tract infection (UTI) until she died of subarachnoidal hemorrhage one year later.

Discussion

This is the first case of EC described after LVAD implantation. EC is a rare disease caused by gas forming microbes with only 237 reports in the literature between 1956 and 2013 [1,2]. Patients with diabetes mellitus, neurogenic bladder, recurrent UTI, and immunosuppression (chemotherapy, corticosteroids, solid or hematologic malignant disease) might be predisposed to complicated UTI [1,2]. The gender ratio is 2 females:1 male and clinical manifestations are frequently misleading ranging from non-specific abdominal pain to severe sepsis. A CT scan is more specific than plain radiography or bladder ultrasonography to aid in the diagnosis of EC, demonstrating a gas accumulation within the bladder wall and lumen [1, 2].

The exact mechanism of gas formation in EC remains unclear but various factors have been suggested, including high levels of glucose within the tissues and urine, which can

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FIG. 1. Abdominal CT scan: Pneumatosis within the bladder wall.

facilitate the fermentation process of anaerobic metabolism and gas-forming ability. In non-diabetes mellitus patients, other chemical substrates (e.g., albumin) leading to gas production and impaired vascular perfusion have been involved in the pathogenic process. *E. coli* and *K. pneumoniae* are the two major organisms isolated from urinary cultures [1,2]. The management of EC generally consists of antibiotics in association with bladder drainage. The overall death rate is approximately 7% [1,2].

Sustained maintenance on LVAD is associated with an increased frequency of serious infections ranging from 20% to 60% after LVAD implantation [3,4]. LVAD recipients have a cellular immunity characterized by a selective loss of Th1 cytokine producing CD4 T cells, a high level of suppressive T regulatory cell, an excess of Th2 response, and a hyper-reactivity of B-cell [5]. This change in cellular immunity may contribute to the high frequency of infection during sustained maintenance LVAD. Because no classical risk factor for EC was found in our patient, we speculate that the LVAD-induced immunosuppression may have facilitated the occurrence of EC.

Conclusion

Emphysematous cystitis is an uncommon disease with non-specific symptoms. The diagnosis is easily done using radiographs or a CT scan. Patients with LVAD should be considered immunocompromised people with an increased risk of developing an EC.

Author Disclosure Statement

No competing financial interests exist.

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Abbreviations Used

CT = computer tomography
EC = emphysematous cystitis
LVAD = left ventricular assist device
NHL = non-Hodgkin lymphoma
UTI = urinary tract infection

Cite this article as: Baldolli A, Nicolle A, Belin A, Pineau S, Milliez P-U, Verdon R (2016) Emphysematous cystitis in a patient with a left ventricular assist device, *Surgical Infections Case Reports* 1:1, 11–12, DOI: 10.1089/crsi.2016.29003.ab.