Case Report

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Case Report: Fournier Gangrene in a Diabetic Patient Using Dapagliflozin

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Abstract

Fournier gangrene is a rare but severe necrotizing infection of the perineal region, requiring immediate medical attention. Sodium-glucose co-transporter 2 (SGLT-2) inhibitors, while effective in managing diabetes and providing cardiovascular benefits, have been linked to rare but serious adverse effects. In 2018, regulatory warnings highlighted a potential connection between these drugs and Fournier gangrene, though reported cases remain scarce. This report details the case of a 59-year-old diabetic female who developed Fournier gangrene during dapagliflozin treatment. The patient presented with extensive perineal necrosis necessitating urgent surgical debridement and initiation of broad-spectrum antibiotics. Microbiological analysis identified Escherichia coli as causative pathogen. Intensive wound management and insulin adjustments led to significant clinical improvement, and the patient was discharged after 24 days. The possible link between SGLT-2 inhibitors and Fournier gangrene remains under investigation. While glucosuria induced by these medications may heighten the risk of infections, the presence of comorbidities such as diabetes and immunosuppression are likely contributing factors. This case emphasizes the complexity of determining causality. Clinicians prescribing SGLT-2 inhibitors should be vigilant for signs of rare infections like Fournier gangrene, especially in patients with multiple risk factors. Prompt diagnosis and aggressive treatment are critical for patient recovery.

Keywords: Case report, dapagliflozin, fournier gangrene, sodium-glucose cotransporter-2 inhibitors

Introduction

Sodium-glucose co-transporter 2 (SGLT-2) inhibitors, including dapagliflozin, have emerged as a cornerstone in the management of type 2 diabetes mellitus (T2DM), offering a range of benefits that extend beyond glycemic control. These agents act by inhibiting the sodium-glucose co-transporter 2 proteins located in the proximal renal tubules, which are responsible for the reabsorption of filtered glucose back into the bloodstream. By blocking this pathway, SGLT-2 inhibitors enhance the urinary excretion of glucose, resulting in reduced plasma glucose levels (1). This multifaceted action not only lowers blood glucose levels but also contributes to significant cardiorenal protection, making SGLT2i valuable in treating both diabetic and non-diabetic patients (2, 3)

Despite their benefits, SGLT-2 inhibitors are not without risks. Rare but serious adverse effects have been reported, including euglycemic diabetic ketoacidosis (DKA), urinary tract infections, and necrotizing fasciitis of the perineum, known as Fournier's gangrene (FG) (4). FG is a rare but life-threatening form of necrotizing fasciitis that affects the external genitalia and perineal region. It is most commonly associated with diabetes mellitus, immunosuppressive conditions, and poor hygiene, all of which may predispose individuals to severe soft tissue infections (1, 5).

The link between SGLT-2 inhibitors and FG was first noted in post-marketing surveillance and case reports, prompting regulatory bodies to issue warnings about this potential association. Although the absolute risk is low, the condition's severity necessitates prompt recognition and management. This case report presents the clinical course of a 59-year-old diabetic patient who developed Fournier's gangrene while on dapagliflozin therapy. The report aims to explore the potential contributory role of SGLT-2 inhibitors in the pathogenesis of FG and to discuss clinical outcomes, emphasizing the importance of vigilance in patients receiving these medications.

Case Report

A 59-year-old female with a history of type 2 diabetes mellitus (T2DM), hypertension (HT), chronic kidney disease (CKD), and coronary artery disease (CAD) presented to the emergency department with complaints of discharge and swelling near the perianal area, painful pubic swelling, and chills. One week prior, the patient had undergone drainage of a perianal abscess,

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followed by the formation of a pubic abscess in the hair-bearing region. The patient attempted self-drainage, which led to worsening symptoms, including fever and chills. Her past history was significant for obesity (BMI 36 kg/m^2). There is no history of smoking in the patient's medical background.

The patient was using the following medications for diabetes at home: insulin aspart (22 units twice daily), insulin glargine (40 units once daily), linagliptin (5 mg once daily), and dapagliflozin (10 mg once daily).

On examination, the patient appeared critically ill with signs of septic shock, including tachycardia and hypotension. Physical examination revealed a large, fluctuant, necrotic abscess extending from the perineum to the mons pubis and gluteal region, consistent with Fournier gangrene.

The patient's HbA1c was 7.73%, with an estimated average glucose of 175.15 mg/dL, indicating suboptimal glucose control. Laboratory Risk Indicator for Necrotizing Fasciitis (LRINEC) score was calculated to assess the risk of necrotizing soft tissue infection (6). Based on laboratory values presented in Table-1, including CRP (320 mg/dL), WBC (35.49 x10^9/L), hemoglobin (7.5 g/dL), sodium (129 mmol/L), creatinine (5.14 mg/dL), and glucose (175.15 mg/dL), the patient's LRINEC score was determined to be 12, placing the patient in the high-risk category, indicating a probability of necrotizing fasciitis greater than 75%.

Upon admission, the patient was started on intravenous antibiotics, including imipenem-cilastatin (500 mg/500 mg twice daily) and teicoplanin (600 mg loading dose followed by 600 mg every 72 hours), based on infectious disease consultation. Emergent surgical debridement was performed under spinal anesthesia. The surgical site was prepared with sterile drapes and a sterile urinary catheter was inserted. A large abscess was identified from the mons pubis, extending into the gluteal region, including a fistula between the gluteal and perineal regions, as shown in Figure-1.

Wound cultures obtained during surgery revealed growth of *Escherichia coli*, which was sensitive to several antibiotics, including imipenem-cilastatin, piperacillin-tazobactam, imipenem, amikacin and ciprofloxacin.

After debridement, vacuum-assisted closure (VAC) therapy was applied to the wound. The patient required intensive care management, including total parenteral nutrition (TPN) and insulin therapy adjustments.

Table 1: Laboratory test of first day of admission

Labs	Value	Reference
Hemoglobin A1c	7.73 %	4.8-5.9 %
Urea	129.1 mg/dL	15-45 mg/dL
Blood urea nitrogen	60.33 mg/dL	7-21 mg/dL
Creatinine	5.14 mg/dL	0.5-0.9 mg/dL
E - Glomerular filtration rate	8,57	
White blood count	35.49 x 10^9/L	4,49-12,68 x 10^9/L
Neutrophils	33.86 x 10^9/L	2.1-8.89 x 10^9/L
Procalcitonin	2.43 ng/mL	0-0.5 ng/mL
C-reactive protein	320.46 mg/dL	0-5 mg/dL
Alanine Aminotransferase	12.9 U/L	0-33 U/L
Aspartate Aminotransferase	18.7 U/L	8-43 U/L

In the following days, the patient's condition improved, with a decline in CRP (from 320 mg/dL to 37 mg/dL) and WBC (from 35.49 to 15.49 x109/L). On the 28th of October, wound cultures showed no growth. The patient was discharged on day 24 with a serum creatinin level of 3.68 mg/dL, CRP of 6 mg/dL and WBC of 7.26 x109/L.

Discussion

Fournier gangrene is a severe, rapidly progressing infection that often results in significant morbidity and mortality if not diagnosed and treated promptly. The treatment of Fournier gangrene involves a combination of surgical and medical approaches, each playing a critical role in halting the progression of the disease and supporting recovery. The primary treatment involves the surgical removal of all necrotic and infected tissue. Early and aggressive debridement is vital to prevent the infection from spreading further into healthy tissues. In addition to surgery, medical management is a cornerstone of Fournier gangrene treatment. Broad-spectrum intravenous antibiotics are used to target the polymicrobial nature of the infection, which typically involves both aerobic and anaerobic bacteria. Supportive care is equally important and includes stabilizing the patient through fluid resuscitation, managing sepsis, and controlling any underlying conditions such as diabetes or immunosuppression (1, 7, 8).

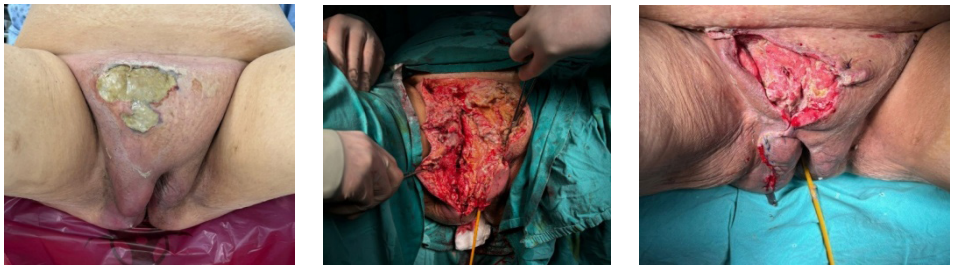

Figure 1. Preoperative image showing the abscess and surrounding tissues, intraoperative image during surgical debridement and postoperative image demonstrating partial closure of the wound

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The use of SGLT-2 inhibitors, such as dapagliflozin, has been associated with an increased risk of genitourinary infections, including Fournier gangrene, due to glucosuria, which may predispose patients to infections. While no direct causal relationship between dapagliflozin and Fournier gangrene can be established, the potential association warrants further investigation.

In comparison to other reported cases of FG, as shown in Table-2, our patient falls within a typical age range. In our case, the patient is 59 years old, while in the literature, most patients with FG tend to be in the 50-70 age range (2, 4, 5, 9, 10). However, there are instances of FG occurring in both younger and older populations, indicating that while age is a factor, it is not the sole determinant for the development of this life-threatening condition (1, 7, 8, 11).

Regarding gender, our patient is female, but the majority of FG cases in the literature involve male patients. In our case, this gender difference aligns with the literature, where men are predominantly affected, likely due to anatomical and hormonal differences that may predispose them to more frequent infections in the genital and perineal regions (1, 2, 4, 5, 7, 11). However, FG in females, although less common, is still recognized, particularly in the presence of comorbid conditions such as diabetes and obesity (8, 9, 10).

Our patient's chronic conditions—DM, HT, CKD, and CAD—are seen in a significant portion of FG cases. In fact, diabetes is one of the most common comorbidities in patients with FG, which is reflected in our case. Several other case reports highlight diabetes as a key risk factor for FG, as poor glycemic control impairs immune function and promotes infection (2, 5, 7, 9).

On admission, our patient's lab results included a significantly elevated white blood cell (WBC) count and C-reactive protein (CRP), which are typical markers of infection and inflammation. The patient's HbA1c was 7.73%, which indicates suboptimal control of her diabetes. In comparison, other FG patients in the literature often present with high WBC counts and CRP levels, and many have suboptimal or poorly controlled diabetes, similar to our case (5, 7, 8, 10, 11). However, the serum creatinine levels in our patient (5.14 mg/dL) were notably higher than those reported in many other studies, reflecting the severity of her chronic kidney disease, which complicates her treatment and recovery.

In terms of management, our patient received broad-spectrum intravenous antibiotics, including imipenem-cilastatin and teicoplanin, which is consistent with the literature. Antibiotic therapy for FG is typically guided by culture results, as polymicrobial infections are common. In our patient, *Escherichia coli* was identified as the causative organism, which was sensitive to a range of antibiotics, including imipenem-cilastatin, amikacin, and ciprofloxacin. However, in cases in the literature *Streptococcus* species were more prevalent (5, 8, 10, 11).

Surgical management, including urgent debridement, is critical in FG, and our patient underwent emergent debridement followed by VAC therapy. The use of VAC therapy is increasingly common in FG cases as it promotes wound healing and reduces infection.

The patient's clinical course following surgery was favorable, with a decline in CRP and WBC counts, and she was discharged after 24 days with significant improvement in her kidney function and resolution of the infection.

In conclusion, our case of Fournier's gangrene highlights several similarities and differences compared to those described in the literature. Like other reported cases, our patient's age, comorbidities, and clinical presentation are consistent with the typical risk factors and symptoms of FG. Early diagnosis, aggressive surgical debridement, and appropriate antibiotic therapy remain the cornerstones of successful management, as demonstrated in our patient and supported by the existing literature.

Conclusion

This case underscores the potential risks associated with the use of SGLT-2 inhibitors, particularly dapagliflozin, in patients with diabetes mellitus. Although these medications offer significant benefits in terms of glycemic control and cardiovascular protection, clinicians must be vigilant in monitoring for rare but serious side effects, including Fournier gangrene. Early detection, appropriate surgical intervention, and antibiotic therapy are crucial for improving outcomes in such cases.

The case report has written in an anonymous characteristic, thus secret and detailed data about the patient has removed.

Table 2: Summary of case reports of Fournier's gangrene associated with SGLT2 inhibitor treatment

Authors	Age	Gender	Smoking	Comorbidities	BMI (kg/ m^2)	Medication (SGLT-2)	WBC (x10^9/L)	Disharge day	CRP (mg/ dL)	HbA 1c (%)	SCr (mg/ dL)	WoundCultureResults	Antibiotics
Jahir et al., 2022	58	Female	n.a.	T2DM, HT, HL	48.3	Empagliflozin	26.6	n.a.	27.0	7.3	1.38	Streptococcusviridans Corynebacterium	Vancomycin, meropenem, clindamycin
Khokhar et al., 2022	55	Male	n.a.	HIV, T2DM, HL, HT, Obstructive sleep apnea	n.a.	Empagliflozin	13	3	n.a.	8.2	0.9	Streptococcusanginosus Staphylococcus epidermidis	Vancomycin, piperacillin-tazobactam, clindamycin (empirically) De-escalated to ampicillin-sulbactam based on culture results
Ellegardand Prytz, 2020	52	Female	Yes	T2DM,HT, asthma, hepatitisB	42	Dapagiflozin	19	18	227	n.a.	n.a.	Combination of aerobic andanaerobicpathogens	Piperacillin tazobactamswitched to meropenem, clindamycin
Elbeddini et al., 2020	72	Male	No	T2DM	n.a.	Canagliflozin	17.8	30	n.a.	7.5	n.a.	Bacteroides ovatus (fragilisgroup),Prevotella denticola,Actinomyces species	Meropenem, vancomycin, clindamycin (emprically) stepped down to oral sulfamethoxazole-trimethoprim, ciprofloxacin, metronidazole
Kumaretal., 2017	41	Male	Yes	T2DM	38	Empagliflozi n	18.3	15	283.1	11.2	n.a.	Streptococcusanginosus Mixedanaerobesand gram negative bacilli	Amoxicillin, gentamicinand vancomycin
Vargoetal., 2021	64	Male	n.a.	AF, CAD, AVR	n.a.	Dapagliflozin	n.a.	9	n.a.	n.a.	n.a.	n.a.	n.a.
Suciuetal., 2024	51	Male	Yes	CAD, AF, HF	n.a.	n.a.	40.2	n.a.	57.78	n.a.	3.29	Klebsiella pneumoniae	n.a.
Naganoetal., 2019	34	Male	Yes	T2DM	28	Empagliflozi n	21.7	41	41	6.5	0.78	Methicillin-resistant Staphylococcusaureus	Meropenem, clindamycinswitched to vancomycin
Elbeddiniet al., 2021	71	Female	n.a.	T2DM, HT, HL	n.a.	Dapagliflozin	33.2	14	n.a.	11.7	2.36	Streptococcusanginosus	Piperacillin- tazobactam, vancomycin, clindamycin (empirically)switched to piperacillin- tazobactam and clindamycin
Thiscase	59	Female	No	T2DM, HT, CKD, CAD	36	Dapagliflozin	35.49	24	320	7.73	5.14	Escherichiacoli	Imipenem-cilastatin, teicoplanin

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