JCRIM (Journal of Current Research in Multidisciplinary)
Vol. 3, No. 1, March 2025
e-ISSN: 3021-8039; p-ISSN: 2988-6600, pp. 344-350

Extensive Subcutaneous Abscess in a Patient with Diabetes Mellitus: A Case Report

Henny Tannady Tan*, Jefri Wijaya, Ade Dharmawan, Nicolas Layanto

Universitas Kristen Krida Wacana

Correspondence Email: henny.tannady@ukrida.ac.id*

Abstract
Abscess is a collection of pus in a tissue, usually caused by bacterial infection. The main symptoms of abscess are local pain, warmth and oedema (if the abscess is located close to the skin layer) or can be accompanied by constitutional symptoms (if the abscess is far from the skin layer or deep). In this case report, we report a case of extensive subcutaneous abscess in a woman with diabetes mellitus complicated by sepsis. The patient came with complaints of enlarged boils in the abdominal area for 2 weeks ago, this complaint was accompanied by other signs and symptoms of infection. The Infectious Diseases Society of America (IDSA) in 2014 classified SSTI into purulent (furuncles, carbuncles, and abscesses) and non-purulent (cellulitis, erysipelas, and necrotizing infections). There are several predisposing factors for skin abscesses, namely skin trauma, oedema caused by impaired lymphatic flow and venous insufficiency, obesity, immunosuppressive conditions (diabetes, HIV), previous infections (tinea, impetigo, varicella) and previous venous actions. Patients with sepsis syndrome or life-threatening infections need immediate surgical intervention and given combination antibiotics.

Keywords: *abscess, diabetes, subcutaneous.*

INTRODUCTION

Skin and soft tissue infections (SSTI) account for 14 million outpatient cases and 900 thousand inpatient cases per year in the United States (Edelsberg et al., 2009; Hersh et al., 2008). SSTI has a wide spectrum ranging from superficial skin abscesses to extensive necrosis of soft tissue or necrotizing soft tissue infections (NSTI) with complications of sepsis (Stevens et al., 2014).

An abscess is a collection of pus in a tissue, usually caused by bacterial infection. The main symptoms of an abscess are local pain, warmth and edema (if the abscess is located close to the skin layer) or can be accompanied by constitutional symptoms (if the abscess is far from the skin layer or deep) (Bush, 2024). Abscesses on the skin can be in the dermis or subcutaneous layer (Weng et al., 2016).

Cases of sepsis in SSTI are 4-8% and are complicated SSTI (cSSTI). cSSTI is the 3rd most common cause of severe sepsis and septic shock after pneumonia and intra-abdominal infection (Eckmann & Dryden, 2010; Engel et al., 2007). Adequate antibiotic initiation is key to improving patient outcomes along with drainage, control of the source of infection and cleaning of necrotic tissue are actions that must be done immediately (Burnham et al., 2016). cSSTI is often associated with various comorbidities in patients (Blanes Hernández et al., 2023).

RESEARCH METHODS

Case Presentation

A 41-year-old woman presented with complaints of an enlarging boil on the upper right abdomen for the past two weeks. Initially, the boil was only the size of a corn kernel. The patient had visited a clinic and was given Amoxicillin with an unknown dosage, along with fever and pain medications. After taking the medication, the boil enlarged further, extending to the epigastric area. In addition to the enlarging boil, the patient also began experiencing fever and abdominal pain around the area of the boil. Other symptoms included nausea, vomiting, decreased appetite, and a noticeable reduction and cloudiness in urination. The patient had no known history of diabetes or hypertension, and denied any other medical conditions. Her daily occupation is a school teacher.

On physical examination, the patient appeared acutely ill with somnolent consciousness, blood pressure of 109/60 mmHg, pulse of 110 beats/min, respiratory rate of 22 breaths/min, and body temperature of 39°C. Abdominal examination revealed a mass in the upper right quadrant extending to the epigastrium measuring approximately 15 x 20 cm, accompanied by redness of the overlying skin, tenderness, warmth upon palpation, and fluctuation in some areas. Other physical examination findings were within normal limits.

Figure 1. Subcutaneous Abscess on the Abdomen

Laboratory findings revealed leukocytosis (white blood cell count 24.75 x 10^3/µL), hyponatremia (Na 122 mmol/L), hyperglycemia (random blood glucose 525 mg/dL, HbA1C 14%), elevated creatinine (urea 107.2 mg/dL, creatinine 4.09 mg/dL), and cloudy urine on urinalysis with specific gravity 1.020, pH 6, protein (+++), glucose (++), ketones (-), blood (-), leukocytes 4–10/HPF. Abdominal CT scan showed skin thickening with extensive subcutaneous edema in the anterolateral wall of the upper right abdomen extending to the lower quadrant of the right breast, involving the right parietal abdominal muscle and subcutaneous fascia (maximum thickness ± 6.6 cm), suggestive of cellulitis. No evidence of deep extension, emphysema, or fluid collection was observed.

Bilateral small kidney stones were noted. Other intra-abdominal organs were within normal limits. Pus culture revealed methicillin-susceptible Staphylococcus aureus.

The patient was assessed with sepsis due to subcutaneous abscess of the abdomen, acute kidney injury secondary to sepsis, and newly diagnosed uncontrolled type II diabetes mellitus. During hospitalization, the patient was treated with maintenance fluids using Ringer's Lactate 2000 cc/24 hours, Ceftriaxone 1x2 gm IV, Levofloxacin 1x750 mg IV every 48 hours, insulin drip with aspart, and other symptomatic treatments. On the second day of treatment, an incision and drainage of the abscess were performed. The patient continued to improve and was discharged after one week of hospitalization.

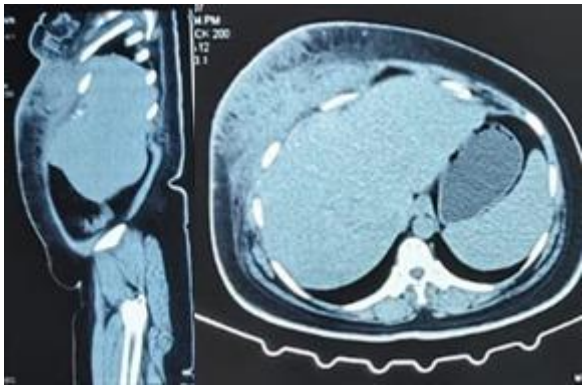

Figure 2. Abdominal CT Scan of the Patient

Figure 3. Abscess Drainage (Left) and Post-Drainage Wound (Right)

RESULTS AND DISCUSSION

Case Discussion

The US Food and Drug Administration in 2013 stated that Acute Bacterial Skin and Skin Structure Infections (ABSSSI) include cellulitis/erysipelas caused by bacterial infections, skin abscesses, and wound infections (US Food and Drug Administration, 2017). The Infectious Diseases Society of America (IDSA) in 2014 classified SSTIs into

purulent (furuncles, carbuncles, and abscesses) and non-purulent (cellulitis, erysipelas, and necrotizing infections) (Stevens et al., 2014).

There are several predisposing factors for the occurrence of skin abscesses, including skin trauma, edema due to impaired lymphatic flow and venous insufficiency, obesity, immunosuppressive conditions (diabetes, HIV), previous infections (tinea, impetigo, varicella), and prior venous procedures (Quirke et al., 2017). The predisposing factor in this patient was diabetes mellitus, which was newly diagnosed during hospitalization. Therefore, it is important to identify and manage predisposing factors or other comorbidities in patients with skin abscesses. For hospitalized diabetic patients with uncontrolled blood glucose levels (> 350 mg/dL), insulin infusion can be administered with a target blood glucose of 140–180 mg/dL (Inzucchi, 2009). In our patient, who had a blood glucose of 525 mg/dL, insulin aspart infusion was administered, and blood glucose was monitored during hospitalization. The patient was discharged with oral antidiabetic medication.

The cause of SSTIs can be identified in about half of the cases. The dominant pathogens are Staphylococcus aureus including methicillin-resistant strains (MRSA), Streptococcus pyogenes, and β-hemolytic streptococci (Garau et al., 2013). Staphylococcus aureus (both methicillin-susceptible and methicillin-resistant) accounts for 75% of skin abscess infections. Risk factors for MRSA include hospitalization in the past 12 months, long-term stay in healthcare facilities, surgical history, undergoing hemodialysis, colonization or previous infection with MRSA, HIV, injection drug use, homelessness, homosexuality, antibiotic use within the past 6 months, working as a prison guard, military activity, living in crowded areas, and sharing used needles (Singer & Talan, 2014). In some areas, the incidence of gram-negative bacterial infections has increased, with some studies reporting up to 30% of cases (Lipsky et al., 2014; Russo et al., 2022). A study in Jakarta identified various microorganisms from cultures of skin infection lesions, with gram-negative bacteria being dominant. Out of 90 subjects, the most common microorganism was Pseudomonas sp (19.5%), followed by Escherichia coli (17.7%), Klebsiella pneumoniae (15%), and gram-positive bacteria such as Staphylococcus aureus (11.5%) and Staphylococcus epidermidis (11.5%) (Natadidjaja et al., 2013). In our patient, Staphylococcus aureus was found in the pus culture, which aligns with common causes of skin abscesses. The MRSA risk factor in this patient was prior antibiotic use.

Antibiotic therapy is divided into empirical and definitive therapy. Empirical antibiotics are selected based on epidemiological data and bacterial resistance patterns in the local community or hospital (Ministry of Health of the Republic of Indonesia, 2013, 2021). The use of empirical antibiotics must also consider the clinical condition, availability, and the antibiotic's ability to penetrate tissue. Combination antibiotics should be considered if polymicrobial infection is suspected. Empirical antibiotic therapy is administered for 24–72 hours followed by evaluation. The duration of definitive antibiotics is determined based on the clinical efficacy in eradicating the bacteria. Furthermore, evaluation should be based on microbiological data, the patient’s clinical condition, and other supporting findings (Ministry of Health of the Republic of Indonesia, 2013).

The SSTI classification by Eron et al. can be used to assess the initial severity level of SSTIs. This classification divides SSTIs into 4 groups. Group 1 consists of patients with no systemic signs or comorbidities complicating treatment and can be treated with

oral or topical antibiotics in an outpatient setting. Group 2 includes patients with systemic symptoms and stable comorbidities or one or more comorbidities without systemic symptoms. Stable comorbidities include peripheral artery disease, diabetes mellitus, and chronic venous insufficiency. These comorbidities can complicate SSTI treatment. Some group 2 patients can be managed outpatient, while others require parenteral antibiotics. Group 3 includes severely ill patients with altered consciousness, tachycardia, tachypnea, or hypotension, or patients who are not severely ill but have unstable comorbidities that may interfere with treatment response. Group 4 consists of patients with sepsis syndrome or life-threatening infections, who require immediate surgical intervention and combination antibiotics (Eron et al., 2003; Nilasari et al., 2021).

Antibiotic selection for SSTIs based on the 2014 IDSA guidelines classifies SSTIs into non-purulent and purulent. Both are further divided into mild, moderate, and severe based on severity. For mild non-purulent infections, oral antibiotics such as Penicillin VK, Cephalosporins, Dicloxacillin, or Clindamycin are recommended. For moderate non-purulent infections, IV Penicillin, Ceftriaxone, Cefazolin, or IV Clindamycin are used. Severe non-purulent infections require immediate debridement and administration of Vancomycin plus Piperacillin-Tazobactam. For mild purulent infections, incision and drainage (I&D) alone is sufficient. For moderate purulent infections, I&D plus culture is performed, and Trimethoprim/Sulfamethoxazole or Doxycycline is given. For severe purulent infections, I&D and culture are performed, and Vancomycin, Daptomycin, Linezolid, Televancin, or Ceftaroline is administered (Stevens et al., 2014).

In our patient, based on the IDSA and Eron et al. classification, the patient was in the severe purulent infection category and group 4. The appropriate empirical antibiotic options were Vancomycin, Daptomycin, Linezolid, Televancin, or Ceftaroline. However, due to elevated creatinine and limited antibiotic availability, the antibiotics were adjusted to Ceftriaxone 1x2 gm IV and Levofloxacin 1x750 mg IV every 48 hours, which are also effective against Staphylococcus aureus. Ceftriaxone and Levofloxacin are recommended for moderate to severe diabetic foot infections caused by Staphylococcus aureus according to IDSA guidelines (Lipsky et al., 2012). For SSTIs, antibiotics are given for 5 to 14 days depending on the clinical condition and immune status of the patient (Spelman, 2022). In our case, parenteral antibiotics were given for 7 days, and the patient showed clinical improvement, reduced leukocyte and creatinine levels, and controlled blood glucose.

According to IDSA guidelines, incision and drainage of pus and debris, compared to ultrasound-guided aspiration, show that aspiration is successful in only 25% of total cases and in less than 10% of MRSA cases. Therefore, aspiration is not recommended by IDSA (Gaspari et al., 2011). Incision and drainage wounds closed with dry gauze are the simplest and most effective method. A study found that packing wounds with gauze for pus absorption caused more pain and did not aid healing compared to simply covering the incision with sterile gauze (O'Malley et al., 2009). In our patient, I&D was performed and the wound was only covered with dry sterile gauze. No more pus was observed by day 4 of treatment until discharge.

CONCLUSION

The Infectious Diseases Society of America (IDSA) in 2014 classified SSTIs into purulent (furuncles, carbuncles, and abscesses) and non-purulent (cellulitis, erysipelas,

and necrotizing infections) (Stevens et al., 2014). There are several predisposing factors for the development of skin abscesses, including skin trauma, edema caused by impaired lymphatic flow and venous insufficiency, obesity, immunosuppressive conditions (such as diabetes and HIV), previous infections (such as tinea, impetigo, varicella), and prior venous procedures (Quirke et al., 2017). Patients with sepsis syndrome or life-threatening infections require immediate surgical intervention and administration of combination antibiotics (Eron et al., 2003; Nilasari et al., 2021).

REFERENCES

Blanes Hernández, R., Rodríguez Pérez, M., Fernández Navarro, J., & Salavert Lletí, M. (2023). Current approach to skin and soft tissue infections. Thinking about continuity of care. *Revista Espanola de Quimioterapia, 36*,37–45. https://doi.org/10.37201/req/s01.10.2023

Burnham, J., Kirby, J., & Kollef, M. (2016). Diagnosis and management of skin and soft tissue infections in the intensive care unit: a review. *Intensive CareMed, 42*, 1899–1911.

Bush, L. M. (2024). *Abscesses*. MSD Manual. https://www.msdmanuals.com/professional/infectious-diseases/biology-of-infectious-disease/abscesses

Eckmann, C., & Dryden, M. (2010). Treatment of complicated skin and soft-tis sue infections caused by resistant bacteria: value of linezolid, tigecycline, daptomycin and vancomycin. *Eur J Med Res, 15*, 554–563.

Edelsberg, J., Taneja, C., & Zervos, M. (2009). Trends in US hospital admis sions for skin and soft tissue infections. *Emerg Infect Dis, 15*, 1516–1518.

Engel, C., Brunkhorst, F., & Bone, H. (2007). Epidemiology of sepsis in Germany: results from a national prospective multicenter study. *Intensive Care Med, 33*, 606–618.

Eron, L., Lipsky, B., Low, D., Nathwani, D., Tice, A., & Volturo, G. (2003). Managing skin and soft tissue infections: Expert panel recommendations on key decision points. *J Antimicrob Chemother., 52*, 3–7.

Garau, J., Ostermann, H., & Medina, J. (2013). Current management of patients hospitalized with complicated skin and soft tissue infections across Europe (2010–2011): assessment of clinical practice patterns and real-life effectiveness of antibiotics from the REACH study. *Clin Microbiol Infect, 19*, E377–E385.

Gaspari, R., Resop, D., Mendoza, M., Kang, T., & Blehar, D. (2011). A randomized controlled trial of incision and drainage versus ultrasonographically guided needle aspiration for skin abscesses and the effect of methicillin-resistant Staphylococcus aureus. *Ann Emerg Med, 57*, 483–491.

Hersh, A., Chambers, H., Maselli, J., & Gonzales, R. (2008). National trends in ambulatory visits and antibiotic prescribing for skin and soft-tissue infections. *Arch Intern Med, 168*, 1585–1591.

Inzucchi, S. (2009). Management of diabetes mellitus in hospitalized patients. *UpToDate*, 1–24.

Kementerian Kesehatan Republik Indonesia. (2013). *Pedoman umum penggunaan antibiotik*.

Kementerian Kesehatan Republik Indonesia. (2021). *Peraturan Menteri Kesehatan Republik Indonesia Nomor 28 Tahun 2021 tentang Pedoman Penggunaan Antibiotik*.

Lipsky, B., Berendt, A., & Cornia, P. (2012). Infectious diseases society of America clinical practice guideline for the diagnosis and treatment of diabetic foot infections. *Clinical Infectious Diseases, 54*(12).

Lipsky, B., Napolitano, L., & Moran, G. (2014). Economic outcomes of inappropriate initial antibiotic treatment for complicated skin and soft tissue infections: a multicenter prospective observational study. *Diagn Microbiol Infect Dis, 79*, 266–272.

Natadidjaja, R. I., Suhendro, Chen, K., & Abdullah, M. (2013). Culture-and nonculture-based antibiotics for complicated soft tissue infections are comparable. *Universa Medicina, 32*(1), 20–28. https://doi.org/http://dx.doi.org/10.18051/UnivMed.2013.v32.20%20-%2028

Nilasari, H., Krisanti, R., Marissa, M., & Agustin, T. (2021). Pedoman penggunaan antibiotik KSM Dermatologi dan Venereologi Rumah Sakit Dr. Cipto Mangunkusumo. *Indonesian*.

O'Malley, G., Dominici, P., & Giraldo, P. (2009). Routine packing of simple cutaneous abscesses is painful and probably unnecessary. *Acad Emerg Med, 16*, 470–473.

Quirke, M., Ayoub, F., McCabe, A., Boland, F., Smith, B., O'Sullivan, R., & Wakai, A. (2017). Risk factors for nonpurulent leg cellulitis: a systematic review and meta-analysis. *Br J Dermatol, 177*(2), 382.

Russo, A., Vena, A., & Bassetti, M. (2022). Antibiotic treatment of acute bac terial skin and skin structure infections. *Curr Opin Infect Dis*, *35*(2), 120–127.

Singer, A., & Talan, D. (2014). Management of skin abscesses in the era of methicillin-resistant Staphylococcus aureu. *N Engl J Med*, *370*(11), 1039.

Spelman, D. (2022). Skin abscesses in adults: Treatment - UpToDate. *Uptodate*, 1–16. https://www.uptodate.com/contents/skin-abscesses-in-adults-treatment?search=absceso cutáneo tratamiwntro&source=search_result&selectedTitle=1~150&usage_type=default&display_rank=1#H1694948660

Stevens, D., Bisno, A., & Chambers, H. (2014). Practice guidelines for the diagnosis and management of skin and soft tissue infections: 2014 update by the Infectious Diseases Society of America. *Clin Infect Dis*, *59*, e10-52.

US Food and Drug Administration. (2017). *Guidance for Industry: Acute bacterial skin and skin structure infections: Developing Drugs for Treatment*.

Weng, Q., Raff, A., Cohen, J., Gunasekera, N., Okhovat, J., Vedak, P., Joyce, C., Kroshinsky, D., & Mostaghimi, A. (2016). Costs and Consequences Associated With Misdiagnosed Lower Extremity Cellulitis. *JAMA Dermatol*.