American Journal of Medical Case Reports, 2022, Vol. 10, No. 1, 1-4
Available online at http://pubs.sciepub.com/ajmcr/10/1/1
Published by Science and Education Publishing
DOI:10.12691/ajmcr-10-1-1

Bilateral Gluteal Abscess by MDR-*Pseudomona Aeruginosa* in a COVID-19 Patient: An Unusual Coinfection

Carlos Zavaleta Corvera[1,*], José Cabanillas Lopez[1], Marisol Guibar[2], Liz Stephanie Muente-Alva[3]

[1]Department of Medicine, Alta Complejidad Virgen de la Puerta Hospital, Trujillo, 13013, Peru
[2]Department of Medicine, Belen Hospital, Trujillo, 13007, Peru
[3]Medical School, Antenor Orrego Private University, Trujillo, 13007, Perú
*Corresponding author: carzavcor_1992@hotmail.com

Received September 27, 2021; Revised November 02, 2021; Accepted November 10, 2021

Abstract An abscess is a collection of bacterial detritus inside of a tissue in the body that can create micro or macro communications with deeper regions if they are not treated on time. Some bacteria can produce necrotizing soft tissue infections that spreads rapidly through the subcutaneous tissue and fascia, producing rapid tissue necrosis. Situation may be more complicated in patients with multiple comorbidities. It reports the case of a young adult patient with insulin-dependent Diabetes Mellitus with poor metabolic control and a history of analgesics and corticosteroids injections in the gluteal region who was diagnosed with COVID-19 and then bilateral gluteal abscess with compromise of the fascia and the muscle in the first weeks of hospitalization.

Keywords: *COVID-19, SARS CoV2, necrotizing fasciitis*

Cite This Article: Carlos Zavaleta Corvera, José Cabanillas Lopez, Marisol Guibar, and Liz Stephanie Muente-Alva, "Bilateral Gluteal Abscess by MDR-*Pseudomona Aeruginosa* in a COVID-19 Patient: An Unusual Coinfection." *American Journal of Medical Case Reports*, vol. 10, no. 1 (2022): 1-4. doi: 10.12691/ajmcr-10-1-1.

1. Background

An abscess is defined as a collection of purulent material built up within the tissue of the body. When superficial infections are not treated on time can create communications with deeper tissues and extend the compromise. In this way, rapidly progressive infections spread through the subcutaneous tissue and fascia, producing rapid tissue compromise and necrosis and general compromising. Situation may be more complicated in patients with multiple comorbidities. It reports the case of a young adult patient with insulin-dependent Diabetes Mellitus with poor metabolic control and a history of analgesics and corticosteroids injections in the gluteal region who was accepted in the Emergency Room by a respiratory failure by COVID-19 and then bilateral gluteal abscess in the first weeks of hospitalization. It is shown from the data how some infections such as COVID-19 can condition not only the appearance of intrahospital pneumonias but also skin infections such as abscesses or necrotizing fasciitis in presumed populations.

2. Objective

Illustrate the results achieved from the diagnosis and treatment of bilateral gluteal absceses with compromise of the fascia and muscles due to MDR - *Pseudomona aeruginosa* in the context of COVID-19.

3. Case Report

We took care a 39-year-old male patient diagnosed with insulin-dependent Diabetes Mellitus for 2 years on treatment with NPH insulin with poor metabolic control and microvascular complications such as diabetic neuropathy, who due to the poor response to the treatment was self-medicating with intramuscular corticosteroids and NSAIDs.

The patient was admitted to the emergency department for respiratory failure secondary to mild ARDS due to SARS-CoV-2 infection and limited ambulation. On examination, he was found tachypneic, with difficulty standing upright, functional limitation of the lower limbs without relevant cutaneous signs and an axillary temperature of 36.8°C (98.24°F). Laboratory tests showed arterial blood gases pH 7.41, pCO2 24.7mmHg, pO2 55 mmHg, HCO3 15.5 mEq/L, PaO2/FiO2 247mmHg, urea 36 mg/dL, serum creatinine 0.82 mg/dl, leukocyte count 7100/mm^3, no bands, neutrophils 92%, lymphopenia 8% and severe thrombocytopenia with a platelet count in 10'000mm^3. Additionally, Hb 17.6 mg/dL, glucose 355 mg/dL and HBA1C 15.9%.

During the second week of hospitalization and already without supplemental oxygen, the impaired deambulation

still persisted, associated with pain in the left gluteal region radiating to the thigh, leg and sole of the foot on the same side. On physical examination, a hardened zone was found in the gluteal region extended towards the thigh without signs of erythema and accompanied by tenderness on palpation and feverish peaks of 38.5°C (101.3°F). A new control of auxiliary tests highlighted leukocyte count 11'830/mm3, neutrophils 80%, bands 2%, lymphopenia 14.9% and platelet count in 12'000mm^3 despite the measures taken. Pelvic x-ray showed radiolucent areas in subcutaneous cellular tissue of the left thigh. Abdominopelvic tomography showed increased thickness and density of the muscular plane of the gluteal region bilaterally to the left predominantly with signs of edema and emphysema of the gluteal muscles (Figure 1).

Patient is admitted to emergency surgery. Fasciotomy and surgical cleaning of abscess is performed in the gluteus and left thigh with drainage of purulent secretion of approximately 800cc at the level of the deep muscular compartment. Empirical antibiotic therapy was started in the immediate postoperative period with vancomycin and imipenem.

Secretion culture isolated *Pseudomonas aeruginosa* highly resistant to aminoglycosides, quinolones, nitrofurans, trimethoprim/sulfamethoxazole, beta-lactams, and carbapenems. Therefore, it was decided to rotate antibiotic therapy with meropenem and colistin for 14 days in addition to daily wound cleaning. Patient was discharged from the hospital after 21 days of treatment.

4. Discussion

An abscess is an infection and inflammation of the body tissue characterized by swelling and the accumulation of pus that can be external and visible, on the skin, or internal. The main etiological agent in several regions is Staphylococcus aureus, although infections by Pseudomonas, Haemophilus and Proteus species have rarely been documented. Purulent material of the abscesses may be contained respecting normal anatomical barriers and structure, usually observing a longitudinal extension of these through the planes. However, other times abscesses can present fistulization to adjacent structures and organs. [1,2]

Some specific bacteria can produce necrotizing soft tissue infections (NSTIs). NSTIs are a rare, aggressive and rapidly progressive form of certain types of infections, which are classified as fasciitis, myositis, and cellulitis. Necrotizing fasciitis is a type of fascial infection associated with rapidly spreading underlying necrosis, which extends through the fascial planes and can easily produce bacteremia with multi-organ compromise. Susceptible sites of infection are those that have been previously exposed trauma or skin lesions and affecting places as abdomen, buttocks and hips in descending order of frequency. Clinically, it can manifest as non-significant skin changes such as erythema, edema and pain. Nevertheless, sometimes may be accompanied by massive systemic reactions [3,4].

The appearance and spreading of multidrug-resistant (MDR) and extensively drug-resistant (XDR) Pseudomonas aeruginosa strains may become a concern for public health for the high risk of severe infections within the hospital context or associated with health care. The main issues remain the difficulty in choosing a suitable empirical antibiotic. The lack of therapeutic alternatives and the limited number of in vivo studies related to the favorable use of antibiotic regimens, the impact of inappropriate therapies and the delay in receiving a suitable antibiotic in the context of MDR / XDR infections is significant in the prognosis of the disease [5,6].

Until very recently, colistin was the only alternative for many cases of MDR P. aeruginosa infection. However, it is not applicable for all contexts since its use can be complicated by its narrow therapeutic window, nephrotoxicity and because the appropriate standard dose has not been adequately determined or established. Recently, the availability of ceftolozane-tazobactam and ceftazidime-avibactam represents a major step forward, mainly due to their activity against several MDR / XDR P. aeruginosa strains, with limited side effects [24,25]. The comparison between antibiotic therapeutic interventions is shown in the Table 1.

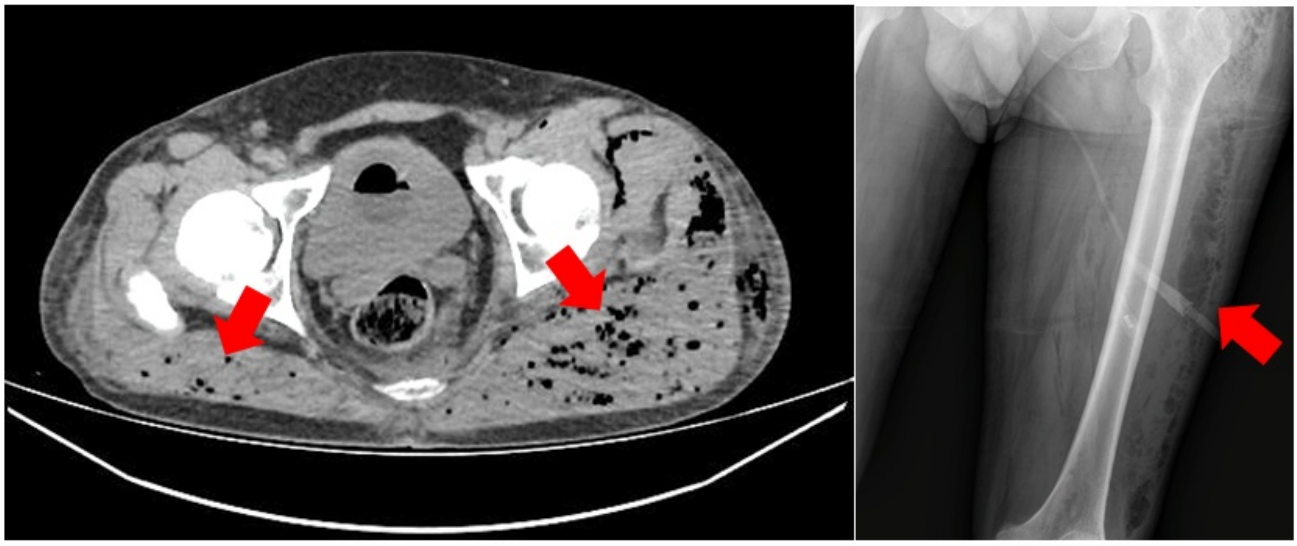

Figure 1. Bilateral gluteal purulent collection with necrotizing fasciitis. CT examination on the left and X-ray of the left lower limb on the right

Table 1. Comparison between antibotic therapeutic interventions

Polymyxins	Polymyxins + carbapenems or tigecycline + or aminoglycosides.	Carbapenems	Other classical antipseudomonal ß-Lactams
Two polymyxins are available for clinical use: Colistin (polymyxin E) and polymyxin B. Several clinical studies focused on colistin for treating MDR P. aeruginosa infections have shown a positive clinical response at different time points between 52% and 79% and the mortality between 11% and 61%. [7,8,9]	Showed that combination therapy with 2 active drugs was associated with better survival than active monotherapy. Recent expert-panel guidelines for optimal use of polymyxins recommend that polymyxin should be used in combination with one or more additional agents to which the pathogen displays a susceptible antibiogram. [10,11,12]	Studies in models evaluated the optimal dosage and type of carbapenems efficacy. In one study the simulated doses that obtained the best antibacterial activity were imipenem at 4 or 5 g/day in continuous infusion combined with tobramycin [11]. Other results performed in vitro and case reports showed that meropenem at 2 g/8 h infused over 3 h and doripenem at 1 g/8 h infused over 4 h showed the best efficacy against *P. aeruginosa*. [13]	There are very few data regarding the role of some classical antipseudomonal ß-lactams in monotherapy against MDR *P. aeruginosa* infections. Some studies showed the utility of i.v. colistin combined with aztreonam or piperacillin-tazobactam with a favorable outcome and survival [14]. Other isolated case reports were performed using monotherapy examples; however, the risk of bias was too high to be considered.
Aminoglycosides	**Fosfomycin**	**Ceftolozane–Tazobactam**	**Ceftazidime–Avibactam**
Some studies in the last years evaluated the optimal dose of some drugs such as tobramycin and imipenem against *P. aeruginosa*. They concluded that a 7-mg/kg dose of tobramycin every 24 h, given in 0.5-h infusions, combined with imipenem was needed to achieve adequate bacterial killing and prevent regrowth at 48 h of carbapenem and aminoglycoside resistant *P. aeruginosa*. [15,16]	Intravenous fosfomycin in combination with other antimicrobials has reemerged for the treatment of infections caused by MDR *P. aeruginosa*. A combination that has shown a good synergistic activity against Pseudomonas isolates is Fosfomycin with carbapenems. This combination ranged from 2 g/12 h to 5 g/8 h in combination with other antimicrobials has also demonstrated better clinical outcomes, especially when the carbapenem is administered in extended infusion. [17,18,19]	Favorable clinical results were obtained after 3 g/1.5 g of ceftolozane-tazobactam administered in continuous infusion. Combination therapy could be considered for high-inoculum infections in order to prevent selection of resistance *in vivo*. [20,21]	Studies *in vitro* have shown that this drug might be a good option for the treatment of MDR *P. aeruginosa* infections. However, the clinical experience is currently limited. Doses of 2/0.5g ceftazidime-avibactam every 8h administered intravenously over 2 h has been recommended for patients with normal renal function. [22,23,24]

5. Conclusion

SARS-CoV-2 infection allows the development of opportunistic infections, due to lymphopenia. Metabolic disorders allow bacterial migration and promote a chronic inflammatory status, so it must be considering the possibility evolve of multi-drug-resistance pathogens infections on patients with those clinical conditions.

Abbreviations

COVID-19, coronavirus disease;
XDR, extensively drug resistant;
ARDS, acute respiratory distress syndrome;
NSAIDs, Nonsteroidal anti-inflammatory drugs;
SARS-CoV-2, severe acute respiratory syndrome;
NSTIs, necrotizing soft tissue infections;
MDR, Multidrug-Resistant.

Author Contributions

Zavaleta Corvera C and Cabanillas Lopez J wrote and compiled the information in the manuscript.

Muente – Alva L and Guibar M was in charge of the correction of the language and writing.

Acknowledgements

“Thanks to all the peer reviewers and editors for their opinions and suggestions”.

Conflict of Interest

The authors declare no conflict of interest

References

[1] Lidid, L, Casas JS. Absceso del iliopsoas: Claves para el diagnóstico imagenológico. *Revista chilena de radiología*, 2017; *23*(4), 163-173.
[2] Reyes NFL, Lombeyda GAF, Córdova LYH, Sánchez DGH. Absceso de psoas. *RECIAMUC*, 2021; *5*(2), 57-63.
[3] Hösl VM, Kehrer A, Prantl L. Die nekrotisierende Fasziitis – ein chirurgischer Notfall [Necrotizing fasciitis-a surgical emergency]. Unfallchirurg. 2020; 123(10): 807-815.
[4] Rogers PJ, Lewis BM, Odak M, Bucher J. Spontaneous Necrotizing Fasciitis. Cureus. 2020; 12(12): 1-6.
[5] Nguyen, L., Garcia, J., Gruenberg, K. et al. Multidrug-Resistant Pseudomonas Infections: Hard to Treat, But Hope on the Horizont. Curr Infect Dis Rep. 2018. 20(8): 23.
[6] Yadav R, Bulitta JB, Wang J, Nation RL, Landersdorfer CB. Evaluation of pharmacokinetic/pharmacodynamic model-based optimized combination regimens against multidrug-resistant Pseudomonas aeruginosa in a murine thigh infection model by using humanized dosing schemes. Antimicrob Agents Chemother. 2017; 61(12). 1-11.
[7] Horcajada JP, Montero M, Oliver A, Sorlí L, Luque S, Gómez-Zorrilla S, Benito N, Grau S. Epidemiology and Treatment of Multidrug-Resistant and Extensively Drug-Resistant Pseudomonas aeruginosa Infections. Clin Microbiol Rev. 2019; 32(4): 19-31.
[8] Benattar YD, Omar M, Zusman O, Yahav D, Zak-Doron Y, Altunin S, Elbaz M, Daitch V, Granot M, Leibovici L, Paul M. 2016. The effectiveness and safety of high-dose colistin: prospective cohort study. Clin Infect Dis 63: 1605-1612.
[9] Tsuji BT, Pogue JM, Zavascki AP, Paul M, Daikos GL, Forrest A, et al. International consensus guidelines for the optimal use of the polymyxins: endorsed by the American College of Clinical

Pharmacy (ACCP), European Society of Clinical Microbiology and Infectious Diseases (ESCMID), Infectious Diseases Society of America (IDS). Pharmacotherapy. 2019; 39(1):10-39.

[10] Zusman O, Altunin S, Koppel F, Dishon Benattar Y, Gedik H, Paul M. Polymyxin monotherapy or in combination against carbapenem-resistant bacteria: systematic review and meta-analysis. J Antimicrob Chemother. 2017; 72(1): 29-39.

[11] Khawcharoenporn T, Chuncharunee A, Maluangnon C, Taweesakul- vashra T, Tiamsak P. Active monotherapy and combination therapy for extensively drug-resistant *Pseudomonas aeruginosa* pneumonia. Int J Antimicrob Agents. 2018; 52(6): 828-834.

[12] Nation RL, Garonzik SM, Li J, Thamlikitkul V, Giamarellos-Bourboulis EJ, Paterson DL, et al. Updated US and European dose recommendations for intravenous colistin:how do they perform?.Clin Infect Dis. 2016; 19(6): 413-418.

[13] Yadav R, Bulitta JB, Nation RL, Landersdorfer CB. Optimization of synergistic combination regimens against carbapenem- and aminoglycoside-resistant clinical *Pseudomonas aeruginosa* isolates via mechanism-based pharmacokinetic/pharmacodynamic modeling. An- timicrob Agents Chemother. 2017; 61(1): 1-17.

[14] Lim T-P, Wang R, Poh GQ, Koh T-H, Tan T-Y, Lee W, Teo JQ-M, Cai Y, Tan T-T, Ee PLR, Kwa AL. Integrated pharmacokinetic-pharmacodynamic modeling to evaluate empiric carbapenem therapy in bloodstream infections.Infect Drug Resist. 2018; 27(11): 1591-1596.

[15] Sabuda DM, Laupland K, Pitout J, Dalton B, Rabin H, Louie T, Conly J. Utilization of colistin for treatment of multidrug-resistant *Pseu- domonas aeruginosa*. Can J Infect Dis Med Microbiol. 2008; 19(6): 413-418.

[16] Brasseur A, Hites M, Roisin S, Cotton F, Vincent J-L, De Backer D, et al. A high-dose aminoglycoside regimen combined with renal replacement therapy for the treatment of MDR pathogens: a proof-of-concept study. J Antimicrob Chemother. 2016; 71(5): 1386-1394.

[17] Layeux B, Taccone FS, Fagnoul D, Vincent JL, Jacobs F. Amikacin monotherapy for sepsis caused by panresistant *Pseudomonas aeruginosa*. Antimicrob Agents Chemother. 2010; 54(11): 4939-4941.

[18] Samonis G, Maraki S, Karageorgopoulos DE, Vouloumanou EK, Falagas ME. 2012. Synergy of fosfomycin with carbapenems, colistin, netilmicin, and tigecycline against multidrug-resistant *Klebsiella pneumoniae*, *Escherichia coli*, and *Pseudomonas aeruginosa* clinical isolates. Eur J Clin Microbiol Infect Dis. 2012; 31(5): 695-701.

[19] Apisarnthanarak A, Mundy LM. Carbapenem-resistant *Pseudomonas aeruginosa* pneumonia with intermediate minimum inhibitory con-centrations to doripenem: combination therapy with high-dose, 4-h infusion of doripenem plus fosfomycin versus intravenous colistin plus fosfomycin. Int J Antimicrob Agents. 2012; 39(3): 271-272.

[20] Asuphon O, Montakantikul P, Houngsaitong J, Kiratisin P, Sonthisombat P. Optimizing intravenous fosfomycin dosing in combination with carbapenems for treatment of *Pseudomonas aeruginosa* infections in critically ill patients based on pharmacokinetic/pharmacodynamic (PK/PD) simulation. Int J Infect Dis. 2016; 50(x): 23-29.

[21] Oliver WD, Heil EL, Gonzales JP, Mehrotra S, Robinett K, Saleeb P, Nicolau DP. Ceftolozane-tazobactam pharmacokinetics in a crit- ically ill patient on continuous venovenous hemofiltration. Antimicrob Agents Chemother. 2016; 60(3): 1899-1901.

[22] Stewart A, Roberts JA, Wallis SC, Allworth AM, Legg A, McCarthy KL. Evidence of clinical response and stability of ceftolozane/ tazobactam used to treat a carbapenem-resistant *Pseudomonas aerugi- nosa* lung abscess on an outpatient antimicrobial program. Int J Anti- microb Agents. 2018; 51(6): 941-942.

[23] Sy SKB, Zhuang L, Sy S, Derendorf H. Clinical pharmacokinetics and pharmacodynamics of ceftazidime–avibactam combination: a model-informed strategy for its clinical development. Clin Pharmaco- kinet. 2018; 58(x): 545-564.

[24] Li J, Lovern M, Green ML, Chiu J, Zhou D, Comisar C, et al. Ceftazidime-avibactam population pharmacokinetic modeling and pharmacodynamic target attainment across adult indications and patient subgroups. Clin Transl Sci. 2018; 12(2): 151-163.

[25] Feldman C, Anderson R. The role of co-infections and secondary infections in patients with COVID-19. Pneumonia (Nathan). 2021 Apr 25; 13(1): 5.