CASE REPORT

SURGICAL SITE INFECTION WITH EXTREME DRUG-RESISTANT *ACINETOBACTER BAUMANII*: A WAKE-UP CALL!

Faraz Waheed, Afaq Saeed Khan, Usman Babar, Manahil Saeed Khan
Khyber Medical College, Peshawar-Pakistan

Surgical site infections are a common complication of surgery with a high prevalence in lower middle-income countries (LMICS). Excessive focus on antibiotic prophylaxis to prevent surgical site infections while neglecting other precautions like aseptic measures, patient nutrition, proper wound care has resulted in the emergence of antibiotic resistant microbials. Such organisms are a menace to healthcare. They cause prolonged hospital stay, use of expensive drugs, increased mortality and morbidity and overall, greatly increased cost of care per patient. We present a case of extreme drug resistant Acinetobacter spp causing surgical site infection following abdominal surgery, from Peshawar, Pakistan. Our patient was an 18-year-old lady who had undergone abdominoplasty following which she developed high grade fever, pain in abdomen and wound discharge. Empiric antibiotics treatment did not improve her condition. Culture and sensitivity report showed the growth of Acinetobacter spp. Which was resistant to almost all of the commonly used antibiotics, with the exception of tigecycline. Patient was treated with tigecycline which resolved her fever and wound infection and she was discharged in a stable condition. We believe our case highlights the importance of antibiotics stewardship and is a wakeup call to healthcare professionals and policy makers to take necessary steps to herald the danger of antibiotics resistance before it is too late.

Keywords: Surgical site infections; Lower middle-income countries; Antibiotic prophylaxis; *Acinetobacter baumanii*

Citation: Waheed F, Khan As, Babar U, Khan MS. Surgical site infection with Extreme drug-resistant *Acinetobacter baumanii*: A Wake-up call! J Ayub Med Coll Abbottabad 2024;36(2):430–2.

DOI: 10.55519/JAMC-02-12363

INTRODUCTION

Surgical Site infections (SSI) defined as "an infection that occurs after surgery in the part of the body where the surgery took place." Surgical site infections can sometimes be superficial infections involving the skin only. Other surgical site infections are more serious and can involve tissues under the skin, organs, or implanted material.[1] Surgical site infections remains one of the most common complications of surgery. While the incidence of Surgical site infection (SSI) is comparatively lower in high income countries, it affects upto one third of surgical patients in lower and middle income countries.[2] Surgical site infections leads to prolonged hospital stay, worsen patient outcomes, and cause increased financial burden on hospitals.[3] Prevention of surgical site infections involve measures such as proper hand hygiene, use of antiseptic techniques, proper dressing of wounds, coated sutures, wound protective devices, among others.[4] In addition, use of antimicrobial prophylaxis has greatly reduced the incidence of surgical site infections.[5] However, the unjust and excessive use of antibiotics have led to a new threat; Antimicrobial resistance (AMR). The prevalence of AMR is much higher among lower middle income countries (LMICS) compared to higher income countries.[6] There are a number of reasons for increased AMR among these countries, including but not limited to, lack of proper knowledge, concerns that hospitals are not adequately clean, following old practices, reluctance to change among physicians, availability of antibiotics without prescription, lack of proper asepsis etc.[7,8] One such organism that has caused a great concern for physicians and microbiologists is multi drug resistant *Acinetobacter baumanii*. Its ability to survive in hospital milieu and persist for long periods of time on various surfaces makes it a frequent cause of healthcare associated infections and responsible for multiple outbreaks.[9] It causes a wide variety of infections including pneumonia, urinary tract infections, surgical site infections and bacteremia. Moreover, it has developed mechanisms to tackle even the most potent of antimicrobials, leading to the development of multidrug, extreme-drug and Pan-drug resistant Acinetobacter species.[10]7/23/2024 9:01:00 PM We shall define multidrug resistant (MDR) Acinetobacter spp as the isolate resistant to at least three classes of antimicrobial agents — all penicillins and cephalosporins (including inhibitor combinations), fluroquinolones, and aminoglycosides. 'XDR *Acinetobacter* spp.' shall be the *Acinetobacter* spp. isolate that is resistant to the three classes of antimicrobials described above (MDR) and shall also be resistant to carbapenems. Finally,

'PDR *Acinetobacter* spp.' shall be the XDR *Acinetobacter* spp. that is resistant to polymyxins and tigecycline.

CASE PRESENTATION

We received an 18-year-old lady from a private health setup where she underwent abdominoplasty a month ago, 20 days after the operation she started experiencing pain at the surgical site and wound started to ooze pus. She presented to the emergency department around the same time with chief complaints of a fever, pain at the surgical site and headaches. Upon examination a purulent discharge was observed from the surgical site and the wound was open. A CBC report was obtained which showed marked leukocytosis.

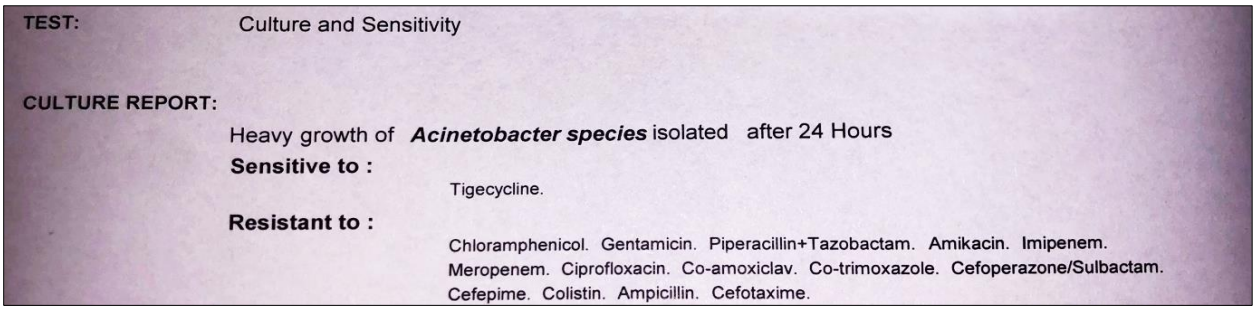
Table-1: Complete blood count

Test(s)	Normal	Unit(s)	Results
WBC	4-11	X10.e 3/ul	23.6
RBC	4-6	X10.e 6/ul	5.93
HGB	11.5-17.5	g/dl	12.7
HCT	36-54	%	40
MCV	76-96	fl	67.5
MCH	27-33	pg	21.5
MCHC	33-35	g/dl	31.8
%RDW-CV	11.5-14.5	%	18
PLT	150-450	X10.e 3/ul	579
MPV	7.2-11	Fl	9.8
%NEUTROPHIL	40-75	%	29.1
%LYMPHOCYTE	20-45	%	29.1

A CRP was also obtained which was raised.

Table-2: C-Reactive protein

Test(s)	Result(s) Units	Reference range
c-reactive protein (CRP)	306.35 mg/L	<5.0



Multiple culture and sensitivity reports were taken and initial report showed growth of *P. aeruginosa*, sensitive to meropenem, imipenem, colistin and aztreonam. The patient was treated with meronem 1g TDS which resulted in initial improvement in fever and pain but on the fifth day of admission the patient developed pus in the surgical site again along with high grade fever and chills. Another culture and sensitivity report was sent, with tissue samples taken from the wound, the results of which are as follows:

The patient was started on tigecycline after which she has shown improvement. The pus from surgical site has reduced and the fever has subsided. Patient was discharged in stable condition.

DISCUSSION

Antimicrobial Resistance (AMR) refers to the phenomenon where bacteria, viruses, fungi, and parasites undergo changes over time, resulting in their diminished responsiveness to medications. This renders infections more difficult to treat and heightens the risk of disease transmission, severe illness, and mortality.[11]

The global spread of drug resistance is rendering antibiotics progressively less effective, resulting in more challenging infections to treat and increased mortality rates. The cost of antimicrobial resistance (AMR) on national economies and healthcare systems is substantial, impacting the productivity of patients and their caregivers due to prolonged hospitalizations and the necessity for costly and intensive care.

Surgical site infections (SSIs) are defined as infections occurring up to 30 days after surgery (or up to one year after surgery in patients receiving implants) and affecting either the incision or deep tissue at the operation site. Despite improvements in prevention, SSIs remain a significant clinical problem as they are associated with substantial mortality and morbidity and impose severe demands on healthcare resources.

The incidence of SSIs may be as high as 20%, depending on the surgical procedure, the surveillance criteria used, and the quality of data collection.[1]

Acinetobacter, a collective group of bacteria commonly present in various environmental sources such as soil and water, has several types. Among them, Acinetobacter baumannii is the predominant cause of infections in humans, responsible for the majority of Acinetobacter-related infections including surgical site infections.[2]

A. baumannii exhibits three primary mechanisms of resistance, including the production of enzymes that render antibiotics inactive, decreased ability for antibiotics to penetrate the target site within bacteria, and mutations leading to changes in the target or cellular functions, resulting in altered susceptibility to antibiotics.[3]

Surgical site Infections with *A. baumannii* infections have been reported at myriads of places around the world with many of them being Multi-drug resistant. For instance, one study delved into the SSIs after cesarean section by Acinetobacter species including *A. baumannii* in a hyperendemic setting within the Brazilian Amazon Region.[12]

Another cross-sectional study carried out in North-east Ethiopia found MDR *A. baumannii* associated surgical site infections along with blood stream and urinary tract infections.[13]

CONCLUSION

Antibiotic resistance is escalating worldwide due to various factors such as over prescription, lack of treatment guidelines, unregulated agricultural use, over-the-counter availability, inadequate infection control, and limited awareness.[14] Combatting resistant organisms presents great challenges, necessitating costly drugs, prolonging hospitalizations, and deteriorating health outcomes.[15] Collective action from individuals, policymakers, and healthcare and agricultural sectors is imperative to address antimicrobial resistance effectively.

REFERENCES

1. Surgical Site Infection (SSI) | HAI | CDC [Internet]. 2021 [cited 2023 Jul 15]. Available from: https://www.cdc.gov/hai/ssi/ssi.html
2. Saito H, Inoue K, Ditai J, Weeks AD. Pattern of Peri-Operative Antibiotic Use among Surgical Patients in a Regional Referral and Teaching Hospital in Uganda. Surg Infect (Larchmt) 2020;21(6):540–6.
3. Lissovoy G de, Fraeman K, Hutchins V, Murphy D, Song D, Vaughn BB. Surgical site infection: Incidence and impact on hospital utilization and treatment costs. Am J Infect Control 2009;37(5):387–97.
4. De Simone B, Sartelli M, Coccolini F, Ball CG, Brambillasca P, Chiarugi M, *et al*. Intraoperative surgical site infection control and prevention: a position paper and future addendum to WSES intra-abdominal infections guidelines. World J Emerg Surg 2020;15(1):10.
5. Bull AL, Worth LJ, Spelman T, Richards MJ. Antibiotic Prescribing Practices for Prevention of Surgical Site Infections in Australia: Increased Uptake of National Guidelines after Surveillance and Reporting and Impact on Infection Rates. Surg Infect 2017;18(7):834–40.
6. Sharma A, Singh A, Dar MA, Kaur RJ, Charan J, Iskandar K, *et al*. Menace of antimicrobial resistance in LMICs: Current surveillance practices and control measures to tackle hostility. J Infect Public Health 2022 2023;15(2):172–81.
7. Kalungia AC, Mwambula H, Munkombwe D, Marshall S, Schellack N, May C, *et al*. Antimicrobial stewardship knowledge and perception among physicians and pharmacists at leading tertiary teaching hospitals in Zambia: implications for future policy and practice. J Chemother 2023;31(7–8):378–87.
8. Butt SZ, Ahmad M, Saeed H, Saleem Z, Javaid Z. Post-surgical antibiotic prophylaxis: Impact of pharmacist's educational intervention on appropriate use of antibiotics. J Infect Public Health 2019;12(6):854–60.
9. Jawad A, Heritage J, Snelling AM, Gascoyne-Binzi DM, Hawkey PM. Influence of relative humidity and suspending menstrua on survival of Acinetobacter spp. on dry surfaces. J Clin Microbiol 1996;34(12):2881–7.
10. Almaghrabi MK, Joseph MRP, Assiry MM, Hamid ME. Multidrug-Resistant Acinetobacter baumannii: An Emerging Health Threat in Aseer Region, Kingdom of Saudi Arabia. Can J Infect Dis Med Microbiol 2018;2018:9182747.
11. CDC. Centers for Disease Control and Prevention. [Internet]. 2022 [cited 2024 Mar 3]. What Exactly is Antibiotic Resistance? Available from: https://www.cdc.gov/drugresistance/about.html
12. Cabral BG, Brasiliense DM, Furlaneto IP, Rodrigues YC, Lima KVB. Surgical Site Infection Following Caesarean Section by Acinetobacter Species: A Report from a Hyperendemic Setting in the Brazilian Amazon Region. Microorganisms 2021;9(4):743.
13. Motbainor H, Bereded F, Mulu W. Multi-drug resistance of blood stream, urinary tract and surgical site nosocomial infections of Acinetobacter baumannii and Pseudomonas aeruginosa among patients hospitalized at Felegehiwot referral hospital, Northwest Ethiopia: a cross-sectional study. BMC Infect Dis 2020;20(1):92.
14. Causes of Antimicrobial (Drug) Resistance | NIH: National Institute of Allergy and Infectious Diseases [Internet]. 2011 [cited 2023 Jul 15]. Available from: https://www.niaid.nih.gov/research/antimicrobial-resistance-causes
15. Naylor NR, Evans S, Pouwels KB, Troughton R, Lamagni T, Muller-Pebody B, *et al*. Quantifying the primary and secondary effects of antimicrobial resistance on surgery patients: Methods and data sources for empirical estimation in England. Front Public Health 2022;10:803943.

Submitted: August 12, 2023	*Revised: April 19, 2024*	*Accepted: April 26, 2024*

Address for Correspondence:
Manahil Saeed Khan, House No. 92, Street-4, Sector A2, Phase-3 Hayatabad, Peshawar-Pakistan
Cell: +92 334 989 9802
Email: mskhan7857779@gmail.com