

Acinetobacter Baumanii as Cause of Septicemia in Burn

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Abstract

Burn patients are prone to sepsis mainly due to the loss of the skin barrier and immunosuppression. Burn wound infections may originate from the patient's endogenous skin, gastrointestinal, and respiratory flora or may be transferred through contact with contaminated external surfaces and infected hands of healthcare workers. Burn patients are vulnerable to infections, especially infections with multidrug resistant organisms which are usually healthcare associated. Healthcare associated infections refer to infections affecting patients in a hospital or other healthcare facility that were not present or incubating at admission. These include occupational infections among healthcare workers and infections acquired in the hospital or other healthcare facilities but appearing after discharge. This study highlights the role of Acinetobacter baumannii as the cause of septicemia in burns.

Keywords: Acinetobacter Baumannii; Septicemia; Burns.

INTRODUCTION

Acinetobacter species are known to cause healthcare associated infections due to their ability to survive for long periods of time on hospital environmental surfaces and their propensity

to develop drug resistance.¹⁻² Acinetobacter baumannii are Gram-negative, nonmotile, nonglucose fermenters, and catalase positive and oxidase negative coccobacilli that possess virulence factors such as porins, capsular polysaccharides, lipopolysaccharides, phospholipases, outer membrane vesicles, metal acquisition, and protein secretion systems. All these contribute to its pathogenesis.³ The prevalence rate of Acinetobacter infection varies from region to region. A prevalence rate of 19.2% was reported in Asia, 17.1% in Eastern Europe, and 14.8% in Africa. The lower prevalence rate was observed in Western Europe (5.6%), Oceania (4.4%), and 3.7% in North America.⁴ Despite the challenges, it poses only a few studies have been done in Nigeria. A prevalence rate of 14% was reported in the Intensive Care Unit of a tertiary hospital in Southwest Nigeria, while none has been documented in North-western Nigeria.⁵

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Multidrug resistant (MDR) *Acinetobacter* is an emerging organism isolated from burn patients which poses a challenge to the management of burns wound sepsis and is associated with mortality rates as high as 35%.⁶ *Acinetobacter* species is also an important etiological agent for healthcare associated infections (HCAs) outbreaks, especially in hospital Intensive Care Unit (ICU) settings.

MATERIALS AND METHODS

This study was conducted in the Department of Plastic Surgery at a tertiary care center in South India after getting the departmental ethical committee approval. Informed written consent was taken from the patient's parents. A 2-year-old male child had accidental scald burns by skipping and falling into hot boiled water. On examination, there are 2nd degree deep and superficial scald burns involving the chest, abdomen, right arm and elbow, lower limbs, back, buttocks, genitalia, and



Fig. 1: Case of Scalds with septicemia

neck (Total body surface area - 48%) (fig. 1).

The child has been admitted to the Burns ICU. Blood culture taken from the central line shows the growth of *Acinetobacter baumannii* as cause of septicemia. Antibiotics and maintenance fluids started according to pediatric orders. The child was managed by Inj. Cloxacillin, Cefoperazone and sulbactam, morphine. In view of persistent fever spikes and worsening respiratory status antibiotics were hiked (Minocycline and Vancomycin). He underwent wound dressing in EMS OT under GA. Paediatric ICU, Critical Care Unit (CCU) consultations are done in view of persistent hypotension. The child was started on Inotropes. The child was intubated by the CCU team in view of respiratory distress. The inotropes dose escalated. The child has one episode of cardiac arrest and was given CPR, calcium, and bicarbonate injections and was revived. He had another apnoeic episode, and despite all resuscitative measures, the Child could not be revived and was declared expired.

RESULTS

In our study, blood culture grew *Acinetobacter Baumannii* (fig. 2) & lead to septicemia & death of the patient.

DISCUSSION

Burn patients are prone to sepsis mainly due to the loss of the skin barrier and immunosuppression. Burn wound infections may originate from the patient's endogenous skin, gastrointestinal, and



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Department of PLASTIC SURGERY-Discharge Summary

BLOOD CULTURE REPORT

HOSP NO	: J-458408	SAMPLE NO	: 307202305170
NAME	: [REDACTED]	ADVISED DATE & TIME	: 20-Feb-23 06:26
AGE/SEX	: 2/M	REPORT DATE & TIME	: 21-Feb-23 09:11
WARD/ROOM/BED	: BURNS ICU 4502/GENERAL/9	SERVICES	: PLASTIC SURGERY
CLINICIAN NAME	: [REDACTED]	SPECIMEN	: BLOOD CULTURE

INITIAL INFORMATION

Diagnosis	48% burns with persistent spikes
No. of bottles received	1
Source	CENTRAL LINE
Blood culture bottle type	BACTALERT PEDIATRIC

REPORT

Pathogen is grown after aerobic incubation in automated blood culture system.

TIME TO POSITIVITY	8.00 Hours
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Time-to-positivity (TTP) denotes the time taken for the blood culture bottle to flag-positive. TTP of blood cultures is considered to be a predictor of the clinical outcome for bacteremia. Lower TTP values are associated with worse clinical outcome; whereas higher TTP values are associated with better clinical outcome.

DIRECT BOTTLE GRAM STAINING

GRAM NEGATIVE BACILLI

ORGANISMS GROWN IN CULTURE

ACINETOBACTER BAUMANNII

Fig. 3: Blood culture report showing growth of *Acinetobacter Baumannii*

respiratory flora or may be transferred through contact with contaminated external surfaces and infected hands of healthcare workers. Burn patients are vulnerable to infections, especially infections with multidrug resistant organisms which are usually healthcare associated. Healthcare associated infections refer to infections affecting patients in a hospital or other healthcare facility that were not present or incubating at admission. These include occupational infections among healthcare workers and infections acquired in the hospital or other healthcare facilities but appearing after discharge. *Acinetobacter baumannii* are Gram-negative, nonmotile, nonglucose fermenters, and catalase positive and oxidase negative coccobacilli

that possess virulence factors such as porins, capsular polysaccharides, lipopolysaccharides, phospholipases, outer membrane vesicles, metal acquisition, and protein secretion systems. All these contribute to its pathogenesis.⁷

Bacterial transmission occurs commonly through incubators and ventilation devices such as respirators. Human infection can occur through water distribution systems and contaminated surfaces. Constant wound surveillance procedures in the hospital help in identifying the risk of infection.⁸

The common infection sites include major infected burns, urinary tract, respiratory, and brain

infections including meningitis. The organism is multidrug resistant there by increasing the morbidity and mortality in burn patients.⁹

CONCLUSION

Acinetobacter Baumannii causes septicemia in burns and is intrinsically resistant to most antibiotics causing significant morbidity and mortality in burns patients. Large randomized studies are required to substantiate the results of our study.

REFERENCES

1. Tekin R, Dal T, Bozkurt F, Deveci O, Palanc Y, Arslan E, *et al.* Risk factors for nosocomial burn wound infection caused by multidrug-resistant *Acinetobacter baumannii*. *J Burn Care Res* 2014;35: e73-80.
2. Sharma S, Kaur N, Malhotra S, Madan P, Hans C. Control of an Outbreak of *Acinetobacter baumannii* in Burn Unit in a Tertiary Care Hospital of North India. *Adv Public Health*. 2014; 2014:1.
3. Van Duin D, Strassel PD, DiBiase LM, Lachiewicz AM, Rutala WA, Eitas T, *et al.* Timeline of healthcare-associated infections and pathogens after burn injuries. *Am J Infect Control* 2016; 44:1511-6.
4. Cardoso T, Almeida M, Friedman ND, Aragão I, Costa-Pereira A, Sarmiento AE, *et al.* Classification of healthcare-associated infection: A systematic review 10 years after the first proposal. *BMC Med* 2014; 12:40.
5. Mahjoub M, Amara A, Bouafia N, Fredj SB, Abdeljalil AB, Njah M. Healthcare-associated infection specificities' in a Tunisian University Hospital: Overview of the Results. *J Adv Med Res* 2017; 24:1-9.
6. Lowman W, Kalk T, Menezes CN, John MA, Grobusch MP. A case of community-acquired *Acinetobacter baumannii* meningitis-has the threat moved beyond the hospital? *J Med Microbiol* 2008; 57:676-8.
7. Lee CR, Lee JH, Park M, Park KS, Bae IK, Kim YB, *et al.* Biology of *Acinetobacter baumannii*: Pathogenesis, antibiotic resistance mechanisms, and prospective treatment options. *Front Cell Infect Microbiol* 2017; 7:55.
8. Vincent JL, Rello J, Marshall J, Silva E, Anzueto A, Martin CD, *et al.* The international study of the prevalence and outcomes of infection in Intensive Care Units. *JAMA* 2009; 302:2323-9.
9. Uwingabiye J, Frikh M, Lemnouer A, Bssaibis F, Belefquih B, Maleb A, *et al.* *Acinetobacter* infections prevalence and frequency of the antibiotic's resistance: Comparative study of Intensive Care Units versus other hospital units. *Pan Afr Med J* 2016; 23:191.

