

Clinical and Microbiological Characteristics of Patients with Bacteremia and Normal Procalcitonin at a Single Tertiary Care Medical Center

Leora Boussi, Tarun Popli, Nicholas Feola, Rajat Nog
Westchester Medical Center— Internal Medicine, Division of Infectious Diseases

Background

- Procalcitonin (PCT) is a serum biomarker used to diagnose bacterial infections and guide antibiotic therapy.
- PCT is thought to have a high sensitivity, specificity, and negative predictive value for bacteremia.
- Classically, PCT > 2 ng/mL is thought to suggest systemic bacterial infection, with PCT 0.5-2 ng/mL suggesting localized infection and < 0.5 ng/mL strongly suggesting absence of infection.
- However, some emerging reports have raised concerns about low sensitivity of PCT for bacteremia.
- Few studies have analyzed the clinical and microbiological characteristics of patients with bacteremia and negative PCT

Methods

Adult patients admitted at Westchester Medical Center with bacteremia and associated PCT level drawn within 24 hours prior to or 48 hours post blood culture collection from 1/1/2014-9/30/2019 were included. Demographic, clinical, laboratory, and microbiological data were retrospectively collected and analyzed.

Results

- 414 total cases of bacteremia met inclusion criteria.
- 209 of 414 (50.5%) patients had PCT < 2ng/mL.
 - 86 were excluded as contaminants (73/86), fungal cultures (10/86), or due to insufficient data (3/86), with 123 patients included in the final analysis
- Amongst analyzed patients with PCT < 2ng/mL, 66 (53.7%) had PCT < .5ng/mL.
- The leading infection source was endovascular/line-related at 31.7%, followed by intraabdominal/gastrointestinal and urinary.
- 30.9% of bloodstream organisms were gram negative.
- In-hospital mortality with bacteremia clinically contributing to death was 13%.

Patient Characteristics, No. (%)		Infection Source, No. (%)	
Age >65	42 (34.1)	Endovascular/Line-Related	39 (31.7)
Male	71 (57.7)	Intraabdominal/ Gastrointestinal	27 (30.0)
Comorbidities, No. (%)		Urinary	13 (10.6)
Diabetes	42 (34.1)	Skin/Bone	12 (9.8)
Cirrhosis	22 (17.9)	Respiratory	8 (6.5)
CKD	21 (17.1)	Oro-dental	5 (4.1)
CHF	18 (14.6)	Unknown/Undetermined	7 (5.7)
COPD	6 (4.9)	Other	9 (7.3)
Immunocompromised*	37 (30.1)	Bacteriologic Characteristics, No. (%)	
Malignancy (Solid or Liquid)	40 (32.5)	Gram +	85 (69.1)
History of Transplant (Solid Organ or Bone Marrow)	14 (11.4)	Gram -	38 (30.9)
		Clinical Parameters	
		Repeat Cultures Drawn, No. (%)	111 (90.2)
		Days to Resolution, median (IQR)	2 (2)
		In-Hospital Mortality, No. (%)	16 (13.0)

Table 1: Characteristics of patients with bacteremia and procalcitonin <2ng/mL. * ≥20 mg of prednisone or equivalent daily for a minimum of 2 weeks, or receipt of other highly immunosuppressive agent within 3 months

Conclusion

- Despite literature supporting the use of PCT in initiation and de-escalation of antibiotics in patients with suspected bacterial infections, a substantial percentage of bacteremic patients can have low PCT but significant infection-related mortality.
- PCT should not be the only factor utilized by clinicians in the management of such patients, including initiating or deescalating antibiotics.
- Further studies are needed to evaluate patient characteristics as contributing factors for bacteremia with low PCT.

Selected References

- Hoeboer SH, van der Geest PJ, Nieboer D, et al. The diagnostic accuracy of procalcitonin for bacteraemia: a systematic review and meta-analysis. *Clinical Microbiology and Infection*. 2015;21(5):474-81.
- Goodlet KJ, Cameron EA, Nailor MD. Low Sensitivity of Procalcitonin for Bacteremia at an Academic Medical Center: A Cautionary Tale for Antimicrobial Stewardship. *Open Forum Infect Dis*. 2020;7(4):ofaa096-ofaa.