253. Is Echocardiogram always indicated in Bacteremia?

Sagy Grinberg, MD[1]; Sandhya Nagarakanti, MD FIDSA[1]; Audai Ibrahim Ma'ayah, MD[1]; Yee Tchao, MD[1]; Eliahu Bishburg, MD[1]; [1]Newark Beth Israel Medical Center, Newark, New Jersey

Session: P-9. Bacteremia

Background: Echocardiography (ECHO) is a commonly used test; and is part of the Duke's criteria for diagnosing endocarditis (IE). Our objectives were to analyze utilization and results of ECHO in pts with bacteremia growing organisms not typically associated with IE, and to evaluate whether ECHO contributed to a diagnosis of IE.

Methods: A retrospective review in a 680-bed tertiary care hospital from 2013–2019. Adult pts with bacteremia with at least 2 positive blood cultures for an organism not typically associated with IE such as *Streptococcus viridans*, Staphylococcus spp. and enterococcus, and who underwent ECHO were included. Data was collected on demographics, blood cultures, timing of ECHO and its' findings. Modified Duke's criteria was used to diagnose IE.

Results: Ninety four pts were included. Mean age 62 yrs. (range 23-91yrs). 50 (53%) were men. DM noted in 49(52%), CAD in 37(39%), CHF in 54 (57%), chronic kidney disease in 22(23%), hemodialysis in 19(20%), history of IE in 9 (10%). Transthoracic ECHO in 34 (36%), transesophageal ECHO in 28(30%), 32(34%) had both. Identifiable sources of bacteremia were urinary tract infection in 9 (10%), pneumonia 5 (5%), PICC line 5 (5%), wound/tissue infection 3 (3%).Clinicians did not specify the indication for ECHO in any of the cases. Unidentified source of bacteremia noted in 72(77%). Bacteremia was community acquired in 70(74%). Mean days of positive blood cultures 5.6 days (range 1–34 days). Gram (-) organism isolated in 44(47%), Gram (+) in 50(53%), of these, 50 (54%) had an implanted devices/indwelling catheter: 39 cardiac implantable device, 12 indwelling/tunneled catheter. The overall yield of ECHO in bacteremia was 11/94 (12%). ECHO in Gram (-) bacteremia had yield of 9% (4/44 pts) of them only 1 met possible IE by Duke's criteria. Gram (+) bacteremia had an ECHO yield of 14% (7/50pts); of them 4 met possible IE Duke's criteria. None of the cases met definite criteria for IE.

Conclusion: Yield of ECHO for the diagnosis of IE in pts with bacteremia with organisms other than *Streptococcus viridans*, staphylococci or enterococci was low even in the presence of implanted devices or indwelling catheters. Better criteria for ECHO utilization will reduce its use and potentially increase its yield.

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254. Review of Clinical Outcomes in Patients Treated with Beta-lactam vs Non-beta-lactam Therapy for AmpC Producing Bacterial Bloodstream Infections

Mary L. Staicu, PharmD[1]; Tyler Baumeister, PharmD[1]; Maryrose R. Laguio-Vila, MD[2]; [1]Rochester General Hospital, Rochester, NY; [2]Rochester Regional Health, Rochester, NY

Session: P-9. Bacteremia

Background: AmpC beta-lactamase producing organisms are traditionally treated with carbapenem or fluoroquinolone antibiotics. Recent studies, however, describe similar clinical outcomes in patients that receive cefepime or piperacillin/tazobactam. We sought to assess outcomes in patients with bloodstream infections caused by AmpC-producing organisms that received beta-lactams compared non-beta-lactam therapy.

Methods: Data was obtained retrospectively from the electronic health record (EHR) from January 2012 to February 2020. The primary objective was 30-day mortality from the day of first positive blood cultures with *Enterobacter* spp., *Citrobacter* spp., or *Serratia* spp. in patients who received non-beta-lactam therapy (carbapenem, fluoroquinolone, trimethoprim/sulfamethoxazole) to those who received beta-lactam therapy (cefepime, piperacillin/tazobactam). Secondary objectives included 30-day recurrence of bacteremia, pathogen isolated, source of bacteremia, hospital length of stay, and duration of antimicrobial therapy.

Results: A total of 90 patients were included, 50 in the non-beta lactam group and 40 in the beta-lactam group. Demographics were similar between groups. Thirty-day mortality was significantly higher in the beta-lactam group (20% vs 2%, p=0.009). *Enterobacter* spp. was the most frequently identified pathogen (67%), most commonly isolated from a urinary (31%) or intra-abdominal source (22%). The average duration of antibiotic therapy was significantly higher in the non-beta lactam group (18 vs 12 days, p=0.001). In contrast, there was no significant difference found in hospital length of stay, recurrence of bacteremia, pathogen isolated or source of bacteremia between groups.

Conclusion: Beta-lactam therapy for the treatment of bloodstream infections caused by Amp-C producing organisms was associated with significantly greater 30-day mortality compared to patients that received non-beta-lactam therapy.

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255. Ticagrelor Aids Platelet-Mediated Clearance in a Refractory Staphylococcus aureus Endovascular Infection with Septic Emboli

Erlinda Ulloa, MD, MSc[1]; Satoshi Uchiyama, MD, PhD[2]; Victor Nizet, MD[3]; George Sakoulas, MD[3]; [1]University of California Irvine, San Diego, California; [2]University of California- San Diego, San Diego, California; [3]5. University of California, San Diego School of Medicine, La Jolla, CA, United States, La Jolla, California

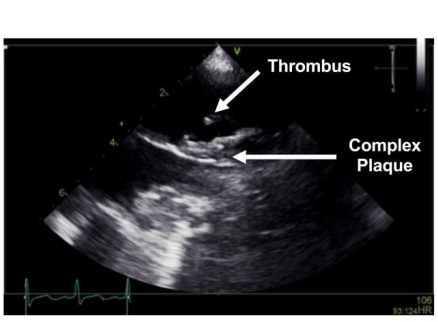
Session: P-9. Bacteremia

Background: The pore-forming alpha-toxin produced by *Staphylococcus aureus* (SA) decreases the viability and increases the clearance of platelets, a critical element of innate immune defense in endovascular infection. Our group recently identified that ticagrelor (TICA) blocks alpha-toxin-induced platelet clearance, protecting mice in a lethal systemic SA infection model. Here, we describe a case report in which TICA, added to antimicrobial therapy of a persistent methicillin-susceptible SA (MSSA) bacteremia associated with a septic aortic thrombus, resulted in immediate bacteremia clearance. We further explore TICA synergy with antibiotics and human platelets *in vitro.*

Methods: Antibiotic susceptibility of an MSSA strain from a patient treated with TICA for refractory bacteremia was tested by MIC and checkerboard assays in MHB or RPMI at standard (10^5 CFU/mL) or high (10^7 CFU/mL) inocula using TICA, ertapenem (ETP), cefazolin (CZ), or nafcillin (NAF) alone vs. ETP+CZ ± TICA. Killing assays with human platelets ± TICA against SA were also performed.

Results: SA bacteremia secondary to a septic aortic thrombus (>4 mm) with multiple secondary pyogenic foci refractory to standard CZ and subsequent salvage CZ+ETP for 5 days rapidly cleared within 24 h after the addition of TICA. Thrombocytopenia resolved concurrently. Discontinuation of TICA on day 12 led to rebound thrombocytopenia, and TICA was restarted, once again resulting in resolution of thrombocytopenia. TICA alone lacked *in vitro* activity against SA, nor was TICA synergistic with ETP+CZ. In contrast, addition of a physiological achievable concentration of TICA dramatically sensitized SA to human platelet killing ($p< 0.001$) *in vitro*.

Figure 1



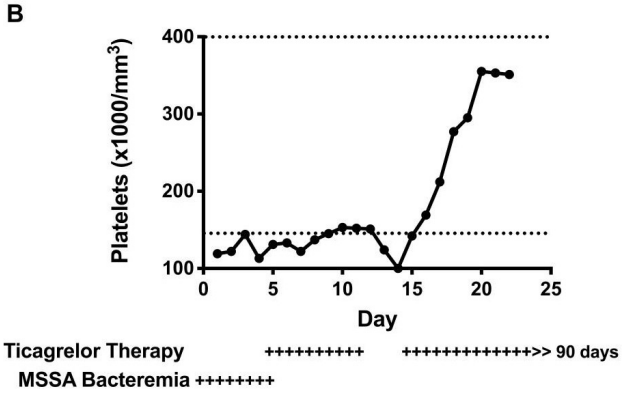


Figure 2

A

Minimum Inhibitory Concentration (mg/L)

	NAF		CZ		ETP		TICA	
	10^5	10^7	10^5	10^7	10^5	10^7	10^5	10^7
MHB	0.50	1	1	4	0.50	1	64 μM	64 μM
RPMI	0.50	1	0.50	1	16	32	64 μM	64 μM

B

Minimum Inhibitory Concentration (mg/L) in CA-MHB

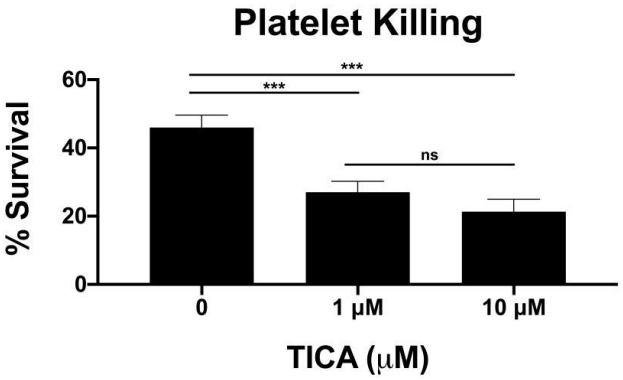
	CZ		ETP	
TICA	10^5	10^7	10^5	10^7
0	1	4	0.50	1
+16 μM	0.50	1	0.50	0.50

C

Checkerboard (CA-MHB)

TICA	10^5	FICI	interpretation
0	CZ+ETP	0.75	additivity
+16 μM	CZ+ETP	0.75	additivity

Figure 3



Conclusion: In a complex case of aortic plaque rupture with septic thrombus, multiple septic emboli, and refractory MSSA bacteremia, addition of TICA to antimicrobial therapy yielded unanticipated immediate clinical and microbiological success. The profound therapeutic effect of TICA *in vivo* was corroborated by the enhanced staphylocidal activity of human platelets *in vitro* in the presence of physiological concentrations of the antiplatelet agent. TICA warrants further study as adjunctive treatment of refractory SA bacteremia due to a primary endovascular focus when thrombocytopenia is present.

Disclosures: **Victor Nizet, MD**, **Centauri Therapeutics** (Advisor or Review Panel member)**Cidara Therapeutics** (Advisor or Review Panel member)**InhibRx** (Advisor or Review Panel member)**Roche Pharmaceutical** (Advisor or Review Panel member)

256. *Serratia Marcescens* Bacteremia and Endocarditis: A Treatment Assessment from an Academic Medical Center

Douglas Slain, PharMD[1]; Catessa Howard, PharMD[2]; Clinton G. Cooper, MD, PhD[2]; [1]West Virginia University School of Pharmacy, Morgantown, West Virginia [2]WVU Medicine, Morgantown, West Virginia

Session: P-9. Bacteremia

Background: Serratia Marcescens (SM) is often an opportunist that has been associated as a cause of healthcare-associated infection and in some people who inject drugs (PWID). Decisions about the treatment of SM infections are difficult given the small clinical studies available and concerns for multidrug resistance. SM has the ability to produce inducible AmpC b-lactamase and may acquire extended-spectrum b-lactamase (ESBL). Evidence-based guidance is lacking in terms of identifying preferred antimicrobial therapy of SM bacteremia and endocarditis. Compared to other reports, our hospital has one of the largest SM data sets to compare.

Methods: This observation study included adult patients admitted to our hospital (2016–2019) with SM bloodstream infections, including endocarditis. Patients were excluded from the analysis, if they had a concomitant infection with another gram-negative organism. Our evaluation was designed to: compare outcomes associated with different antibiotic regimens, evaluate how care differed in PWID patients versus others, and identify factors associated with obtaining infectious diseases expert consultations (ID Consult).

Results: Forty-three patients met study inclusion/exclusion. Twenty-eight patients (65.1%) had ID Consults. Twenty-four (55.8%) were PWID. Endocarditis was diagnosed in 30.2% of patients. The most common regimen was cefepime +/- aminoglycoside, followed by a carbapenem +/- aminoglycoside. Combination therapy was only recommended during ID Consult. Piperacillin-tazobactam was used in 11.6% of patients. No regimen displayed an efficacy or safety advantage over another. Most patients (90.7%) cleared their blood stream within 48 hours of antibiotic start. Phenotypic susceptibility testing did not identify either ESBL or AmpC production in any of the isolates, including recurrences. Multi-drug resistance was not appreciated. Significant factors associated with obtaining ID Consult were: PWID (p=0.004), endocarditis (p=0.0002), sepsis (p=0.022), surgical intervention (p=0.003).

Conclusion: We could not identify an advantage with any particular antibiotic treatment regimen in this study. Induction of AmpC or selection of ESBL organisms was not displayed by any of the organisms.

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257. *Staphylococcus aureus* Bacteremia: Does Intravenous Drug Use Impact Quality of Care and Clinical Outcomes?

Kristen McClellan, BA, BSN[1]; Cami Hilsendager, MD[2]; Strnad Luke, MD[3]; [1]OHSU, Portland, Oregon; [2]The Vancouver Clinic, Vancouver, Washington; [3]Oregon Health and Science University and Portland State University School of Public Health, Portland, Oregon

Session: P-9. Bacteremia

Background: Individuals with intravenous drug use (IDU) have higher risk for *Staphylococcus aureus* bacteremia (SAB) and increased management complexity. The goal of this study was to compare differences in SAB characteristics, adherence to standard of care metrics, and clinical outcomes in those with and without IDU.

Methods: A retrospective chart review was conducted on cases of SAB between January 1, 2016 and December 31, 2017 at a 500-bed teaching hospital. Inclusion criteria was age > 18 years and ≥ one blood culture positive for *S. aureus*. Patients were excluded if they transferred hospitals, had care withdrawn or died within 48 hours of diagnosis or had a ventricular assist device infection. Records were reviewed for substance use, SAB characteristics, standards of care, and outcomes. Data were analyzed using SPSS software. The study was approved by the Institutional Review Board.

Results: In 248 patients with SAB, 28.2% had documented IDU. Median age was 37 (IDU) and 57 (non-IDU). In the IDU group, 75.7% had the formal diagnosis of opioid use disorder and 78.9% of stimulant use disorder. IDU was associated with hepatitis C and houselessness while non-IDU was associated with diabetes, hemodialysis, and cancer. Those with IDU had higher rates of MRSA, endocarditis, and spinal infections, but did not have higher rates of polymicrobial infections or venous thrombosis. There was no difference in appropriate repeat blood cultures, antibiotic management, and ID consultation. Length of stay and against medical advice (AMA) discharges were higher in those with IDU. There was no difference in 90-day recurrence or readmission, but 90-day mortality was higher in the non-IDU group.

Table 1. Patient Demographics

	Total (n=248) N (%)	**IDU** (n=70, 28.2%) N (%)	**Non-IDU** (n=178, 71.8%) N (%)	**P-value**
Age (median)	52 (IQR 36.3-64.0)	37 (IQR 29.8-50.0)	57 (IQR 44.8-67.3)	**<0.001**
Sex				
▪ **Male**	165 (66.5)	43 (61.4)	122 (68.5)	0.285
▪ **Female**	83 (33.5)	27 (38.6)	56 (31.5)	
Race				
▪ **White**	213 (85.9)	61 (87.1)	152 (85.4)	0.517
▪ **Non-white**	35 (14.1)	9 (12.9)	26 (14.6)	
Comorbidities				
▪ **Hepatitis C** [a]	43/179 (24.0)	34/64 (53.1)	9/115 (7.8)	**<0.001**
▪ **HIV** [a]	8/180 (4.4)	4/64 (6.3)	4/116 (3.4)	0.383
▪ **Diabetes**	63 (25.4)	7 (10.0)	56 (31.5)	**<0.001**
▪ **Hemodialysis**	16 (6.5)	0 (0.0)	16 (9.0)	**0.010**
▪ **Malignancy**	42 (16.9)	1 (1.4)	41 (23.0)	**<0.001**
Houselessness	36 (14.5)	29 (41.4)	7 (3.9)	**<0.001**
IDU Characteristics				
▪ **Heroin use** [a]		57/68 (83.8)		
▪ **Opioid use disorder** [b]		53/64 (75.7)		
▪ **Methamphetamine use**		59 (84.3)		
▪ **Stimulant use disorder** [b]		45/57 (78.9)		
▪ **Alcohol use disorder**		15 (21.4)		
▪ **Polysubstance use**		50 (71.4)		
▪ **IMPACT consult**		30 (42.9)	28 (15.7)	

IDU= Intravenous Drug Use/ HIV= Human Immunodeficiency Virus/ IMPACT= Improving Addiction Care Team

[a] Denominators differ from total cohort due to variable not being clearly identified as present or absent based on definitions established for chart review

[b] Denominators differ from total cohort due to inability to categorize nature of formal substance use disorder diagnosis based on definitions established for chart review