Catheter-Associated Urinary Tract Infection (CAUTI) by an Emerging Multi-Drug Resistant (MDR) organism in ICU Patients.

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INTRODUCTION

- Catheter Associated Urinary Tract Infections are the most common type of healthcare-associated infections (National Healthcare Safety Network).[1]
- Long term catheterization and prolonged ICU stay increase the chances of acquiring infection

Case 1 (HOPI)

- A 29-year-old female was shifted from another hospital to our hospital in the intubated condition.
- After 4 days of the normal vaginal delivery, abdominal pain started with oliguria and altered sensorium, She was then shifted to our hospital
- She was a known case of Post Partum Haemorrhage (PPH) and Pregnancy Induced Hyperglycemia

Investigations

CT Scan:

- Abdominal wall cellulitis with cystitis, Both Kidney appear normal
- **CT brain** – NAD

HBA_1C: 7.4

Total Protein: 5.2

Blood Urea: 87

2D ECHO : NAD

Procalcitonin : 5.27

LDH : 273

T3 : 0.34

T4: 2.42

TSH : 1.43

Patient was catheterized on admission. Foley's was changed on the 9th day of admission.

Fever Spike was noted on 11th day of admission,

Summary of CBC and Culture

Day of Admission	WBC Per mm^3	Neutrophil %	Lymphocyte %	Blood Culture	Urine Culture
"0" day	15400	88	10	No Growth	No Growth
2nd day	18800	88	8		
4th day	11400	85	10		
6th day	7000	72	10	No Growth	No Growth
7th day	8700	70	15		
10th day	9800	73	16		
11th day	14300	79	13		Culture sent again, **GNO reported**
12th day	10600	73	16		
13th day	16100	80	10		
14th day	20100	90	6		
15th day	18100	92	4		

- Multi Organ Dysfunction syndrome developed on 14th day of admission.
- Bladder anterior and posterior was necrotic slushed of frank thick purulent discharge → Bladder wall removed. (14th day of admission)
- Antibiotics
  - Meropenem (14 days), Tigecycline (12 days), Metronidazole (12days); Velmixin and Linezolid (14days),
  - Antibiotic added (Minocycline), as per urine culture and sensitivity reports. After 7 days of susceptible drug course completion, antibiotics were stopped

Case 2 (HOPI)

- A 41-year male patient was referred from another hospital Post tracheostomy with post-Intra Cranial Drainage (ICD) inserted condition after D-J stenting
- The patient had right side pleural effusion with Right Thigh swelling and restricted movements
  - K/C/O Tuberculosis with ongoing modified AKT due to deranged LFT
  - Suspected for pyelonephritis
  - Final Diagnosis was Urosepsis, Tubercular empyema, Dyselectroletemia with Right thigh pyomyositis

Investigations

X-Ray:

- Spina Bifida S1

MRI (Thigh) : Diffuse inhomogeneous marrow signal abnormality seen

USG: B/L Pleural effusion with consolidation

- Mild hepatosplenomegaly

ANA :	negative
Bili:	3.62 mg/dL
DB:	2.63 mg/dL
IB:	0.99 mg/dL
SGOT :	70 U/Lt
SGPT:	190 U/lt

Procalcitonin : 7.99 ng/mL

- Patient was catheterized on admission and Foley's was changed on the 6th day
- Fever Spike was noted on 9th day of admission.

Summary of CBC and Culture

Day of Admission	WBC Per mm^3	Neutrophil %	Lymphocyte %	Blood Culture	Urine Culture
"0" day	12300	82	9	*Klebsiella pneumoniae*	No Growth
5th day	14000	82	8		
9th day	12300	79	10		Culture sent again, **GNO reported**
10th day	21800	89	5		
18th day	12800	78	13		
20th day	15900	79	12		

Hospital Course

- Thigh abscess was drained
- Antibiotics were changed as per urine culture sensitivity reports
  - Meropenem (14days), Ceftazidime + Avibactum (2days),
  - Linezolid (15 days) and Polymyxin B (7 days) with AKT
  - Minocycline (7 days) added after urine culture report. Antibiotics were stopped after course completion,

Case 3 (HOPI)

- A 55-year-old male was referred from another hospital with the intubated and unconscious condition
- He was admitted to another hospital for sudden breathlessness for 3 days with mild cough from 5 days,
- On admission there was oliguria
- On examination: B/L lung crepitus
  - CVS: S1S2 clear
  - BSL : 322 ml/dL

- He was a Type 2 Diabetes for around 7 years and maintain with oral hypoglycaemic agents with Insulin
- He had other co-morbidity like hypertension from the last 2 years with medication.
- His primary diagnosis was Acute on chronic kidney disease with urosepsis and Lower respiratory tract infection with cardiogenic shock
- He was also a case of multi-organ failure
- Treatment was started with :
    - Inj. Noradrenalin, Inj. Clopidogrel, Inj. Statins

Investigation

USG Abdominal

- Right side pleural effusion
- B/L raised renal echogenicity

2 D Echo

- Global LV Hypokinesis
- LVEF: 30-35
- Grade II LVD
- Mild MR. No AR, TR.
- No PAH

MRI Brain

- Acute infarct in Left precentral gyrus
- Chronic ischemic changes
- WBC: 21100; CRP: 65
- SGOT: 156
- Blood Urea: 132; S. Creatinine: 3.9

- Central Line catheter insertion and Intubated with ET Tube
- Foley's catheter was inserted on admission which kept for 8 days but it was changed on 8th day. Fever spike was noted on 10th Day.

Summary of CBC and Culture

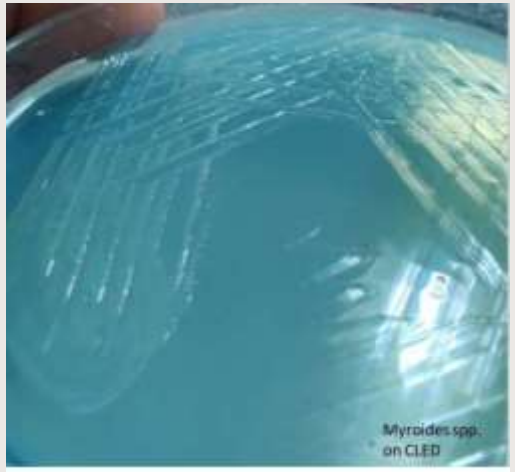
Day of Admission	WBC Per mm^3	Neutrophil %	Lymphocyte %	Blood Culture	Urine Culture
"0" day	21100	91	3	No Growth	No Growth
2nd day	16300	82	10		
3rd day	11300	79	15		
8th day	16900	81	12		
10th day	19000	81	12	No Growth	
12th day	14800	79	13		Culture sent again, **GNO reported**
17th day	10000	78	12		
20th day	8000	68	2z		

Hospital Course

- At that patient was on Meropenem (7 days), Teicoplanin (10 days), and Levofloxacin (6 days).
- Minocycline (7 days) added after urine culture report. Antibiotics were stopped after course completion
- Urine culture was sent after completion of treatment which reported No Growth’.

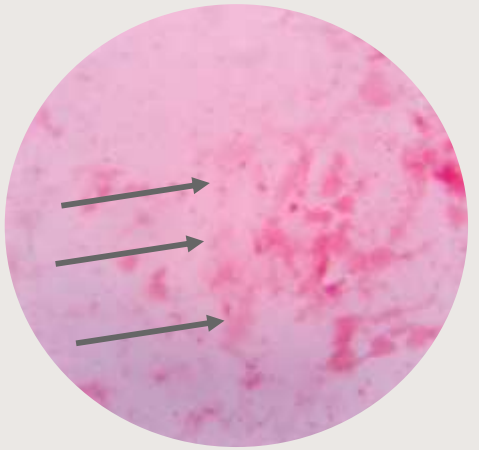
Laboratory diagnosis

- Mid-stream Clean Catch Urine specimens collected from catheterized patients in Intensive care units.
- Urine culture was processed as per standard protocol
- Gram Negative Non-Fermenter Colonies were grown on the agar plates.



NLF colonies

CLED Agar



Gram Stain

Organism Quantity:

Selected Organism : Myroides spp

BP Infection Site:

Source: URINE **Collected: Sep 28, 2021**

Comments:	

Identification Information	**Analysis Time:**	6.57 hours	**Status:**	Final
Selected Organism	97% Probability	**Myroides spp**		
	Bionumber:	5040000200040000		
ID Analysis Messages				

RESULTS

- All 3 patients had catheter insertion/reinsertion residing in intensive care units. Post administration of catheter extensive drug resistance ***Myroides species*** was isolated.
- All the isolates were sensitive to Minocycline and were resistant to beta-lactams (including extended-spectrum cephalosporins and beta-lactamase inhibitors), monobactams, carbapenems, aminoglycosides, fluoroquinolones, polymyxins, and sulfonamides.
- Previous reports of isolated outbreaks of UTIs following exposure to a contaminated water source or in the trauma setting are reported in the literature

- In all 3 patients, prolonged ICU stays, and variating risk factors could have been instrumental in causing these MDR ***Myroides*** urinary infections.
- The source of the infection was not determined, but these might be related to care in the maintenance of the catheter.
- Patients started immediately after early detection on combination therapy with **Minocycline** as prolonged therapy responded well and had better prognosis in our cases.

Discussion

- *E. coli*, *Enterococcus spp*, *Pseudomonas aeruginosa* and *Klebsiella pneumoniae* are most common organisms associated with CAUTI. However, it can also be due to some emerging rare Gram-negative organism
- These rare clinical isolates are often non-pathogenic but Immunocompromised patients can be susceptible to these
- ***Myroides*** species are a rare cause of human infection. Infections are rare but can occasionally be life-threatening. It is an opportunistic pathogen that causes serious infections like septicaemia, pneumonia, and UTI.
- The two most common ***Myroides species*** seen in humans are ***M. odoratus*** and ***M. odoratimimus***.

- In the index case, the primary portal of entry and infection source postulated to be the presence of Foley's catheter, possibly because of the strong tendency of ***Myroides spp.*** to form biofilms.
- In the case of ***Myroides*** UTI, the susceptibility to various antibiotics reported in the literature is quite variable. Therefore, choosing the appropriate antimicrobial treatment for ***Myroides*** infections can be quite challenging because of the limited clinical experience.
- Verma et al[5] and Chauhan et al[6] reported successful treatment of ***Myroides*** infection sensitive only to Minocycline, similar as in our clinical cases.

Take Home Message

- The most important risk factor for developing a catheter-associated UTI (CAUTI) is prolonged use of the urinary catheter. Therefore, catheters should only be used for appropriate indications and should be removed as soon as they are no longer needed.

- Rapid Accurate identification of ***Myroides species*** utmost important for prompt treatment along with hospital infection control practices

1. https://www.cdc.gov/hai/ca_uti/uti.html. CDC guidelines Hospital Associated Infections (HAI)
2. Benedetti P, Rassu M, Pavan G, Sefton A, Pellizzer G. Septic shock, pneumonia, and soft tissue infection due to Myroides odoratimimus: report of a case and review of Myroides infections. Infection. 2011;39(2):161–165
3. Hu SH, Yuan SX, Qu H, Jiang T, Zhou YJ, Wang MX, et al. Antibiotic resistance mechanisms of Myroides sp. J Zhejiang Univ Sci B. 2016;17(3):188–199. doi: 10.1631/jzus.B1500068
4. Solanki R, Dawar R, Aggarwal DK, Rani H, Imdadi F, Jasuja S. Nonfermenting gram-negative bacilli and urinary tract infection-sorting the mystery of infections caused. J Med Microb Diagn. 2015;4(4):21. doi: 10.4172/2161-0703.1000210.
5. Verma Y, Hemachander SS, Shah K. Urinary tract infection caused by Myroides spp. In diabetic patients: to be or not to be. Indian J Case Rep. 2018;4(1):1–3. doi: 10.32677/IJCR.2018.v04.i01.001.
6. Chauhan K, Chaturvedi P, Singh RP, Pandy A. Myroides causing catheter associated urinary tract infection in diabetic patiente: Am emerging multidrug resistant superbug. J of clinical and Diag research. 2020;14(11):DR01-04
7. Meyer A, Dang H, Roland W. Myroides spp. Cellulitis and bacteremia : A case report. Id Cases 2019;18:e00638
8. Lorenzin G, Piccinelli G, Carlassara L, et al. Myroides odoratimimus urinary tract infection in an immunocompromised patient: an emerging multidrug resistant micro-organism. Antimicrob Resist infection Control 2018; 7(96) doi: 10.1186/s13756-018-0391-4

T H A N K Y O U