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CASE REPORT

Case Report on Multi-Drug Resistance Urosepsis in 19-Year-Old Female

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Bacteria

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ABSTRACT

Background: Multiple drug resistance (MDR) has emerged as a serious consequence of the overuse of antibiotics. Kidney stone disease results from the formation of crystalline aggregates of urinary solutes within the kidney or urinary tract. In some cases, the stone moves into the ureter, requiring a ureteral stent replacement procedure for management. However, the use of unsterilized equipment during such procedures can lead to urinary tract infections (UTIs).
Objective: This case study highlights the development of MDR *Pseudomonas aeruginosa* following the treatment of a UTI in a patient undergoing ureteral stent replacement.
Method: The patient developed a UTI post-procedure, confirmed through urine culture, which identified Pseudomonas aeruginosa as the causative agent. Multiple antibiotics were administered to control the infection.
Results: Despite antibiotic therapy, the patient's condition did not improve. A subsequent urine culture revealed the development of MDR due to the excessive use of antibiotics. Most antibiotics tested showed resistance, with only colistin remaining effective. Treatment with colistin was initiated and continued for 14 days. Follow-up results indicated complete bacterial inhibition and no further infection progression, leading to the patient's stable condition.
Conclusion: This case underscores the importance of rational antibiotic use and proper sterilization techniques to prevent MDR infections, especially in patients undergoing invasive procedures such as ureteral stent placement.

INTRODUCTION

The emergence of multidrug-resistant (MDR) bacterial infections has become a critical global health concern, posing serious challenges to healthcare systems. MDR infections are associated with prolonged hospital stays, increased healthcare costs, and higher mortality rates (Wartu *et al*. 2019). Of particular concern is MDR urosepsis, a life-threatening condition that originates in the urinary tract and spreads into the bloodstream (Porat *et al.* 2023). This condition is difficult to manage due to the resistance of the causative bacteria to multiple antibiotics, leaving limited treatment options. Although carbapenems remain the cornerstone of current treatment strategies, their overuse has resulted in growing resistance. Alternative therapeutic options such as beta-lactam/beta-lactamase inhibitor combinations, cefiderocol, polymyxins, aminoglycosides, and fosfomycin have been explored as potential treatments (Kunz Coyne *et al*. 2022).

The rise of antibiotic-resistant microorganisms represents one of the greatest threats to modern medicine. The overuse and misuse of antibiotics, combined with the rapid spread of resistance genes among bacterial populations, have significantly contributed to the global burden of MDR infections. Previously, antibiotic-resistant strains were largely confined to nosocomial (hospital-acquired) infections; however, these resistant strains have now become widespread in both community and healthcare settings, infection control measures to prevent the spread of resistant pathogens affecting both Gram-positive and Gram-negative bacterial species (McKinnon *et al*. 2018; Walker *et al*. 2022).

Kidney stone disease, also known as nephrolithiasis or

urolithiasis, is a common urological disorder characterized by the formation of crystalline aggregates of urinary solutes within the kidney or urinary tract. The pathogenesis, risk factors, and management options for kidney stones vary considerably. They may put a stent into one or both ureters, depending on the reason for the stenting. Allow urine to bypass a kidney stone (renal calculi) that slows or stops urine flow (Guliciuc *et al*. 2021). This stenting procedure Prevent a new blockage from developing after kidney stone treatment. Prevent a blockage from postoperative swelling after the removal of kidney stone. Due to nonsterile instruments used during procedure may lead to MDR urosepsis. It is caused by multidrug-resistant bacteria, is a very serious medical condition where a urinary tract infection (UTI) spreads to the bloodstream. MDR bacteria are resistant to multiple antibiotics, making treatment more challenging and potentially increasing the risk of severe complications like organ failure, sepsis-induced shock, and death. It poses a significant Danger due to the difficulty in finding effective antibiotics to treat the infection. Treatment options may involve using a combination of antibiotics or newer antimicrobial agents. Diagnosis was made in 2107 (7.7%) cases amongst 27,542 patients screened. Microbiological proof of infection was available in 1606 (5.8%) cases. In total, 408 patients had microbiologically proven urosepsis (Petrosillo *et al*. 2020).

Cases were registered from Europe (n: 311–76%), Asia (n: 66–16.1%), Africa (n: 21–5.1%) and USA (n: 10–2.4%). Type of hospital cases were registered from university (n: 228–56%), teaching (n: 107–26%), district (n: 69–17%) and others (n: 4–1%). Mean age of patients with urosepsis was 63 ± 17 years, and the female-to-male ratio was 3:7. An intervention prior to the episode of urosepsis was reported in 324 (79%) cases (clean: n: 77–24%, clean contaminated: n: 99–31%, clean contaminated with bowel segments opened: n: 57–18%, contaminated: n: 28–9%, infected: n: 63–19%, missing: n: 2). A urinary catheter at the time of diagnosis was present in 287 (70%) cases, and urinary tract obstruction was reported in 234 (57%) cases. Urolithiasis was reported in 20% (n: 76, missing n: 21) of cases (Rozwadowski and Gawel 2022).

Given the growing burden of MDR urosepsis, particularly among patients with underlying urological conditions such as kidney stones, there is an urgent need to promote rational antibiotic use and implement stringent.

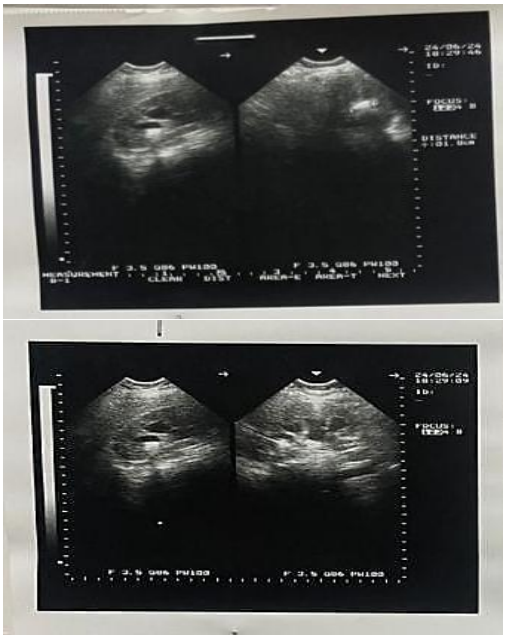
CASE PRESENTATION

A 20 year old female presented in emergency department of private setup with symptoms of high-grade fever, chill, nausea, vomiting. And difficulty in urinating and from last 3 days there is moderate obstruction in urinating. Also, she had Right flank pain radiating to the groin from last 4 days. Patients' past history has shown that the patient is suffering from kidney stones from the last 4 years. According to the physical examination the patient's blood pressure is 140/90 mmHg, pulse 112 bpm, and body temperature is more than 37.5ºC. A ureteral stent was placed to relieve the obstruction of urine and allow the urine to pass from the kidney to the bladder. The stone is removed, and the discomfort of the patient was reduced. But after 3 days of ureteral stent placement the patient had high grade fever, and also have symptoms includes: nausea chill and vomiting. She was again presented to the same setup and was admitted to hospital again due to her severe condition. Empirically she was treated with paracetamol (infusion 1 g/100 mL) and some other antibiotics. After few days when she was not recovered Ultrasound and X-ray imaging examination again perform and show that infection begin in the ureter where the ureter stent placement performs. The reason behind is that during stent placement the equipment that are used are not fully sterilize. So, due to no sterility of the equipment the UTI infection begins. According to the abdominal examination there is tenderness in the right flank and costovertebral angle. Ultrasound and X-ray imaging examinations shows that there is a 13mm stone in her right kidney and in left kidney there is 11mmstone at start she was treated with the pain management and hydration. Alpha blockers were prescribed to facilitate the the stone passage. The patient was subsequently treated with Cefixime 400 mg, paracetamol (1 g/100 mL infusion), diclofenac, amikacin sulfate, ceftriaxone sodium, meropenem, multivitamins, antiemetics, and moxifloxacin. She showed partial improvement and was discharged home. However, a few months later, she presented to the emergency department again in a worsened state.

A urine culture was performed, which after 48 h of incubation, identified Pseudomonas species (Fig. 1–2). Her condition had significantly deteriorated, and due to the excessive and prolonged use of antibiotics, she had developed multiple drug resistance (MDR). Only a limited number of antibiotics showed susceptibility. Her treatment was adjusted based on the antibiotic susceptibility results, which initially produced some improvement. However, a repeat urine culture revealed that only Colistin remained effective against the isolated bacterial strain. The patient was started on Colistin, and iron supplementation (Sangobian) was prescribed to support her overall health. Despite this, her condition remained suboptimal.

Investigations

Laboratory investigations confirmed complete resistance to several antibiotics, including Amikacin, Aztreonam, Ciprofloxacin, Imipenem, Meropenem, Ceftazidime, and Levofloxacin. The urine culture indicated that Colistin was the only remaining effective option. To further assess the extent of the infection, a CT-KUB (Kidney, Ureter, and Bladder) scan was performed (Fig 3). The scan revealed the presence of infectious material and pus accumulation, prompting the recommendation for another ureteral stent placement to relieve the obstruction. Additional laboratory results showed a significantly elevated serum parathyroid hormone (PTH) (Fig. 4) level of 649 pg/mL. A parathyroid



Aiima

RENAL ULTRASOUND

RIGHT KIDNEY:

. Right kidney shows 13mm stone upper pole .No hydronephrosis is seen. Renal cortex & medulla is well appreciated. No cystic disease of the kidney is seen. No signs of back pressure changes noted in the pelvicalyceal system of the kidney.

LEFT KIDNEY.

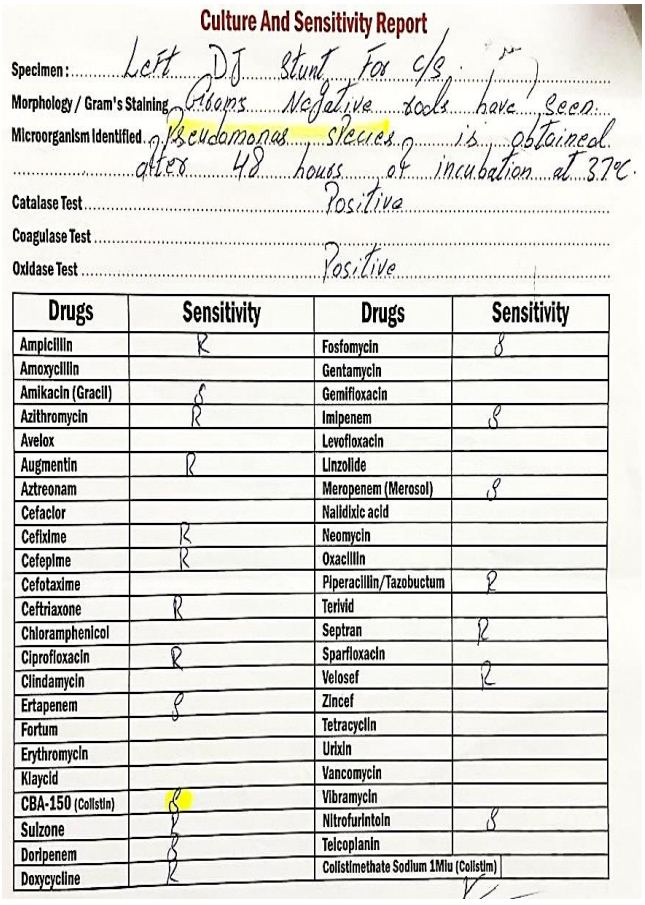
Shows 11 mm stone upper pole mild hydronephrosis And dilatation of upper ureter.

Dilated ureter shows 8 mm stone mid and 9 mm stone distal ureter Good cortical thickness and CMD.

URINARY BLADDER is full , no stone or any other abnormality.

Liver . Spleen, Pancreas & Gall Bladder are seen normal.

Fig. 1: Ultrasound reports of renal calculi



Culture And Sensitivity Report

Specimen: Left DJ Stunt For c/s

Morphology / Gram's Staining: Gram -ve rods have been

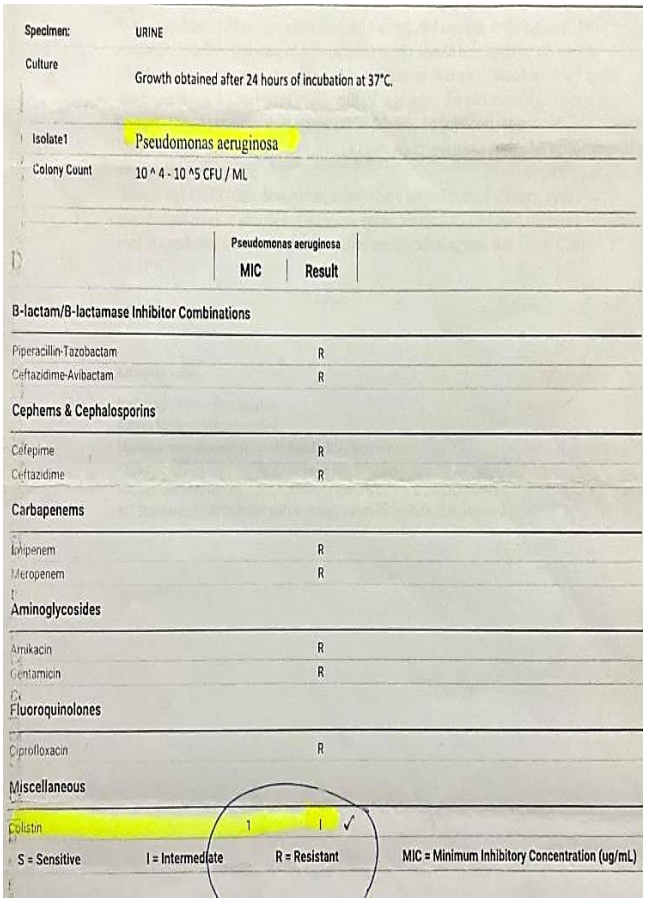
Microorganism Identified: Pseudomonas species is obtained after 48 hours of incubation at 37°C.

Catalase Test: Positive

Coagulase Test:

Oxidase Test: Positive

Drugs	Sensitivity	Drugs	Sensitivity
Ampicillin	R	Fosfomycin	S
Amoxycillin		Gentamycin	
Amikacin (Gracil)	S	Gemifloxacin	
Azithromycin	R	Imipenem	S
Avelox		Levofloxacin	
Augmentin	R	Linzolide	
Aztreonam		Meropenem (Merosol)	S
Cefaclor		Nalidixic acid	
Cefixime	R	Neomycin	
Cefepime	R	Oxacillin	
Cefotaxime		Piperacillin/Tazobuctum	R
Ceftriaxone	R	Terivid	
Chloramphenicol		Septran	R
Ciprofloxacin	R	Sparfloxacin	
Clindamycin		Velosef	R
Ertapenem	S	Zincef	
Fortum		Tetracyclin	
Erythromycin		Urixin	
Klaycid		Vancomycin	
CBA-150 (Colistin)	S	Vibramycin	
Sulzone	S	Nitrofurintoin	S
Doripenem	S	Teicoplanin	
Doxycycline	R	Colistimethate Sodium 1Miu (Colistim)	



Specimen: URINE

Culture: Growth obtained after 24 hours of incubation at 37°C.

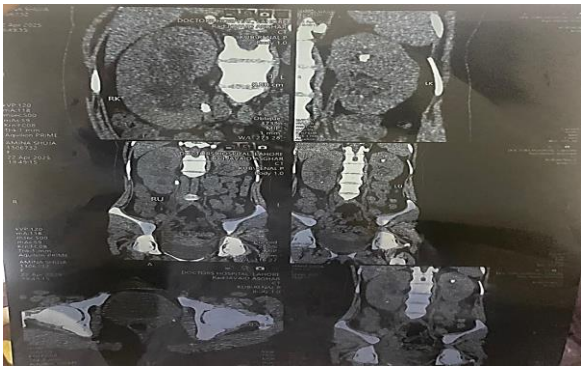
Isolate1: Pseudomonas aeruginosa

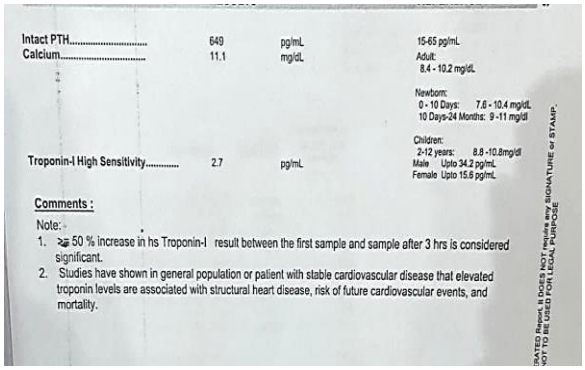
Colony Count: 10 ^ 4 - 10 ^5 CFU / ML

	Pseudomonas aeruginosa	
	MIC	Result
B-lactam/B-lactamase Inhibitor Combinations		
Piperacillin-Tazobactam		R
Ceftazidime-Avibactam		R
Cephems & Cephalosporins		
Cefepime		R
Ceftazidime		R
Carbapenems		
Imipenem		R
Meropenem		R
Aminoglycosides		
Amikacin		R
Gentamicin		R
Fluoroquinolones		
Ciprofloxacin		R
Miscellaneous		
Colistin	1	I ✓

S = Sensitive I = Intermediate R = Resistant MIC = Minimum Inhibitory Concentration (ug/mL)

Fig. 2: Culture report and repeated antibiotic sensitivity for *P. aeruginosa*





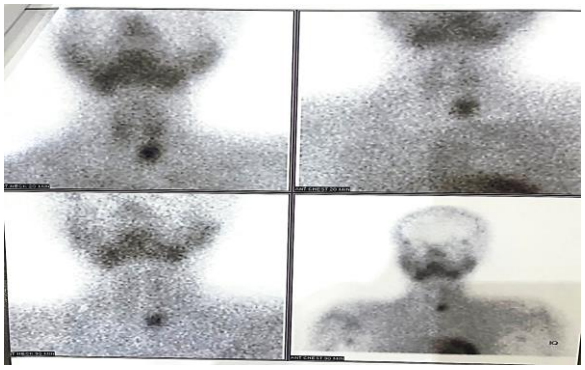
Intact PTH	649	pg/mL	15-65 pg/mL Adult: 8.4 - 10.2 mg/dL Newborn: 0 - 10 Days: 7.6 - 10.4 mg/dL 10 Days-24 Months: 9 -11 mg/dl Children: 2-12 years: 8.8 -10.8mg/dl
Calcium	11.1	mg/dL	
Troponin-I High Sensitivity	2.7	pg/mL	Male Upto 34.2 pg/mL Female Upto 15.6 pg/mL

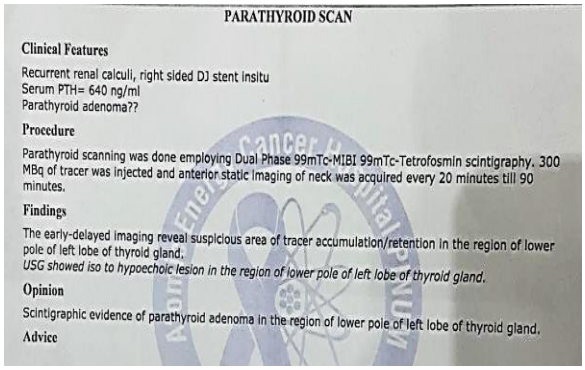
Comments :

Note:

1. ≥ 50 % increase in hs Troponin-I result between the first sample and sample after 3 hrs is considered significant.
2. Studies have shown in general population or patient with stable cardiovascular disease that elevated troponin levels are associated with structural heart disease, risk of future cardiovascular events, and mortality.

Fig. 3: Report of CT-KUB and serum PTH (649)





PARATHYROID SCAN

Clinical Features

Recurrent renal calculi, right sided DJ stent insitu
Serum PTH= 640 ng/ml
Parathyroid adenoma??

Procedure

Parathyroid scanning was done employing Dual Phase 99mTc-MIBI 99mTc-Tetrofosmin scintigraphy. 300 MBq of tracer was injected and anterior static imaging of neck was acquired every 20 minutes till 90 minutes.

Findings

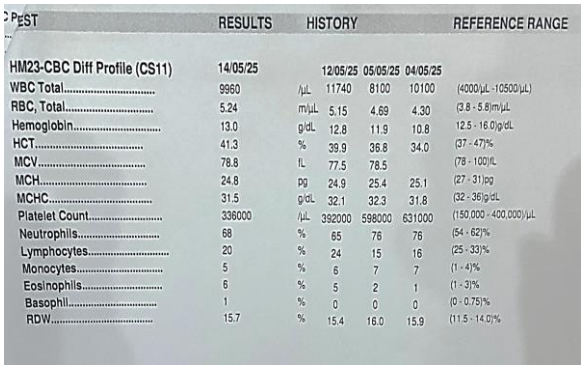
The early-delayed imaging reveal suspicious area of tracer accumulation/retention in the region of lower pole of left lobe of thyroid gland.
USG showed iso to hypoechoic lesion in the region of lower pole of left lobe of thyroid gland.

Opinion

Scintigraphic evidence of parathyroid adenoma in the region of lower pole of left lobe of thyroid gland.

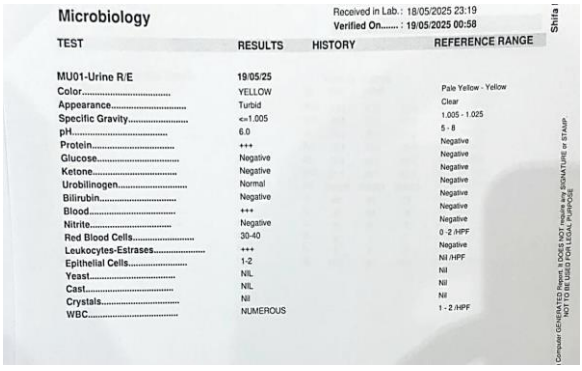
Advice

Fig.4: Parathyroid scan



TEST	RESULTS		HISTORY			REFERENCE RANGE
HM23-CBC Diff Profile (CS11)	**14/05/25**		**12/05/25**	**05/05/25**	**04/05/25**	
WBC Total	9960	/µL	11740	8100	10100	(4000/µL - 10500/µL)
RBC, Total	5.24	mi/µL	5.15	4.69	4.30	(3.8 - 5.8)m/µL
Hemoglobin	13.0	g/dL	12.8	11.9	10.8	12.5 - 16.0)g/dL
HCT	41.3	%	39.9	36.8	34.0	(37 - 47)%
MCV	78.8	fL	77.5	78.5		(78 - 100)fL
MCH	24.8	pg	24.9	25.4	25.1	(27 - 31)pg
MCHC	31.5	g/dL	32.1	32.3	31.8	(32 - 36)g/dL
Platelet Count	336000	/µL	392000	598000	631000	(150,000 - 400,000)/µL
Neutrophils	68	%	65	76	76	(54 - 62)%
Lymphocytes	20	%	24	15	16	(25 - 33)%
Monocytes	5	%	6	7	7	(1 - 4)%
Eosinophils	6	%	5	2	1	(1 - 3)%
Basophil	1	%	0	0	0	(0 - 0.75)%
RDW	15.7	%	15.4	16.0	15.9	(11.5 - 14.0)%

Fig. 5: Pre-operative CBC reports

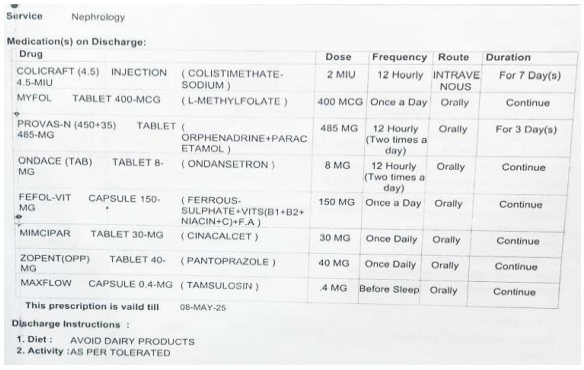


Microbiology

Received in Lab.: 18/05/2025 23:19
Verified On.....: 19/05/2025 00:58

TEST	RESULTS	HISTORY	REFERENCE RANGE
MU01-Urine R/E	**19/05/25**		
Color	YELLOW		Pale Yellow - Yellow
Appearance	Turbid		Clear
Specific Gravity	<=1.005		1.005 - 1.025
pH	6.0		5 - 8
Protein	+++		Negative
Glucose	Negative		Negative
Ketone	Negative		Negative
Urobilinogen	Normal		Negative
Bilirubin	Negative		Negative
Blood	+++		Negative
Nitrite	Negative		Negative
Red Blood Cells	30-40		0 -2 /HPF
Leukocytes-Estrases	+++		Negative
Epithelial Cells	1-2		Nil /HPF
Yeast	NIL		Nil
Cast	NIL		Nil
Crystals	Nil		Nil
WBC	NUMEROUS		1 - 2 /HPF

Fig. 6: Post-operative urine report



Service Nephrology

Medication(s) on Discharge:

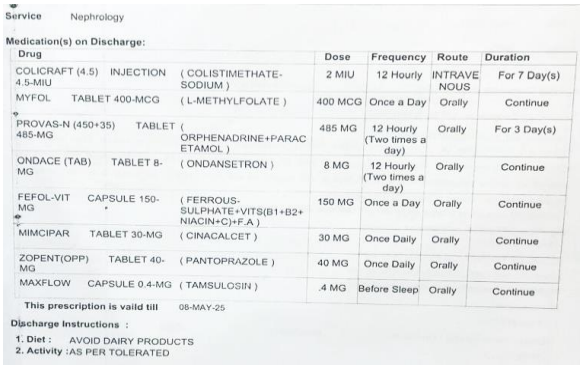
Drug		Dose	Frequency	Route	Duration
COLICRAFT (4.5) INJECTION 4.5-MIU	(COLISTIMETHATE-SODIUM)	2 MIU	12 Hourly	INTRAVENOUS	For 7 Day(s)
MYFOL TABLET 400-MCG	(L-METHYLFOLATE)	400 MCG	Once a Day	Orally	Continue
PROVAS-N (450+35) TABLET 485-MG	(ORPHENADRINE+PARACETAMOL)	485 MG	12 Hourly (Two times a day)	Orally	For 3 Day(s)
ONDACE (TAB) TABLET 8-MG	(ONDANSETRON)	8 MG	12 Hourly (Two times a day)	Orally	Continue
FEFOL-VIT CAPSULE 150-MG	(FERROUS-SULPHATE+VITS(B1+B2+NIACIN+C)+F.A)	150 MG	Once a Day	Orally	Continue
MIMCIPAR TABLET 30-MG	(CINACALCET)	30 MG	Once Daily	Orally	Continue
ZOPENT(OPP) TABLET 40-MG	(PANTOPRAZOLE)	40 MG	Once Daily	Orally	Continue
MAXFLOW CAPSULE 0.4-MG	(TAMSULOSIN)	.4 MG	Before Sleep	Orally	Continue

This prescription is vaild till 08-MAY-25

Discharge Instructions :

1. Diet : AVOID DAIRY PRODUCTS
2. Activity :AS PER TOLERATED

Fig. 7: Post-operative urine report



Service Nephrology

Medication(s) on Discharge:

Drug		Dose	Frequency	Route	Duration
COLICRAFT (4.5) INJECTION 4.5-MIU	(COLISTIMETHATE-SODIUM)	2 MIU	12 Hourly	INTRAVENOUS	For 7 Day(s)
MYFOL TABLET 400-MCG	(L-METHYLFOLATE)	400 MCG	Once a Day	Orally	Continue
PROVAS-N (450+35) TABLET 485-MG	(ORPHENADRINE+PARACETAMOL)	485 MG	12 Hourly (Two times a day)	Orally	For 3 Day(s)
ONDACE (TAB) TABLET 8-MG	(ONDANSETRON)	8 MG	12 Hourly (Two times a day)	Orally	Continue
FEFOL-VIT CAPSULE 150-MG	(FERROUS-SULPHATE+VITS(B1+B2+NIACIN+C)+F.A)	150 MG	Once a Day	Orally	Continue
MIMCIPAR TABLET 30-MG	(CINACALCET)	30 MG	Once Daily	Orally	Continue
ZOPENT(OPP) TABLET 40-MG	(PANTOPRAZOLE)	40 MG	Once Daily	Orally	Continue
MAXFLOW CAPSULE 0.4-MG	(TAMSULOSIN)	.4 MG	Before Sleep	Orally	Continue

This prescription is vaild till 08-MAY-25

Discharge Instructions :

1. Diet : AVOID DAIRY PRODUCTS
2. Activity :AS PER TOLERATED

Fig. 8: Post-operative medications

Fig. 9: Culture report for *Pseudomonas aeruginosa* after medication alteration

scan confirmed parathyroid dysfunction

Treatment

During her hospital stay, the patient received Colistin (2 mg) twice daily for 14 days. Follow-up laboratory tests showed significant improvement, with bacterial growth successfully inhibited. Renal function improved, as reflected by normalization of creatinine levels and estimated glomerular filtration rate (eGFR). Her white blood cell (WBC) count decreased from 17,000 to 9,000. The treatment plan was continued, and based on her laboratory and imaging results, a multidisciplinary approach was adopted. A stepwise treatment protocol was implemented, which included surgical removal of the overactive parathyroid gland, responsible for hypercalcemia and recurrent kidney stone formation. In the same surgical session, laser lithotripsy was performed to remove the kidney stones, both procedures conducted under a single anaesthesia. Following surgery, the patient showed gradual clinical improvement (Fig. 5–9).

DISCUSSION

Multi drug resistance is a sever condition in which the patient develop resistance to the antibiotic because of the excessive use. Multidrug resistance (MDR) is a kind of acquired resistance of microorganisms and cancer cells to chemotherapeutic drugs that are characterized by different chemical structures and different mechanisms of action (Linhares *et al*. 2015). Urolithiasis is a disorder that is characterized by the development of solid crystalline aggregates of urinary solutes within the urinary space of the kidney. Her are the number of treatments to treat the kidney stone. For the ureteral obstruction the ureteral stent placement is used now day other procedures are also used to treat ureteral obstruction (Parajuli *et al*. 2017). Here we discuss the case report of a patient who had ureteral obstruction. Ureteral stent placement is used for treatment but due to non-sterile conditions of the equipment's the patient develops Urosepsis. And due to excessive use of the antibiotics the patient develops antibiotic resistance. Patient is badly affected and in critical condition. From this case presentation we can assure that the effect of colistin has shown to the bacteria without any severe adverse effects leading to a progressive treatment (Babar *et al*. 2021).

Overall, this case illustrates the growing threat of MDR in urological settings and highlights the significance of infection control practices and antibiotic stewardship in preventing such complications.

CONCLUSIONS

This case highlights the serious complications that can arise from inadequate sterilization and excessive antibiotic use, leading to multidrug-resistant urosepsis. Strict aseptic techniques and rational antibiotic use are essential to prevent such infections. Colistin proved effective in managing the MDR infection, demonstrating its potential as a last-resort treatment option in similar cases.

AUTHOR CONTRIBUTIONS

All the authors contributed equally to the write up.

CONFLICTS OF INTEREST

The authors affirm that they possess no conflicts of interest.

DATA AVAILABILITY

Not applicable

ETHICS APPROVAL

Informed consent was obtained from patient.

FUNDING SOURCE

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