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KLEBSIELLA VARIICOLA URINARY TRACT INFECTION: A MISIDENTIFIED PATHOGEN

Microbiology

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ABSTRACT

The identification of *Klebsiella variicola* is difficult using conventional biochemical tests as it resembles *Klebsiella pneumoniae* in many aspects. It has been detected in a wide range of clinical samples including blood, tracheal aspirates, and urine. We present a case of a 23-year-old antenatal woman who came to obstetrics and gynecology casualty with complaints of pain in the abdomen for one day and no bleeding or leaking per vagina. A routine urine sample for culture was done which grew a lactose fermenting organism identified as *Klebsiella variicola* by MALDI-TOF MS. Due to the ambiguity in the identification of this pathogen, it may be missed when conventional methods are applied. Hence, automated systems are needed to resolve such diagnostic dilemmas.

KEYWORDS

Klebsiella variicola, antenatal, urinary tract infection, uterine anomaly

INTRODUCTION

The *Klebsiella pneumoniae* complex belongs to the *Enterobacterales*. *Klebsiella variicola* is named so because of its ability to inhabit different places which has been gaining much attention from researchers and causing infections in humans worldwide(4) . Morphologically it is a Gram-negative bacillus which is a non-motile and facultative anaerobe. It helps in fixing nitrogen and promotes plant growth. The members of this complex are misidentified which is a barrier in the study of *K. variicola*, leading to lacunae in understanding the clinical outcomes within healthcare systems(1). Hence, we present a case of urinary tract infection by *K. variicola* in a 23-year-old antenatal female with a uterine anomaly

Case Presentation:

A 23-year-old antenatal (36 weeks) female came to obstetrics and gynecology casualty with complaints of pain in the abdomen for one day and no bleeding or leaking per vagina. She was diagnosed with a bicornuate uterus at first abortion in 2022 with no other comorbidities. She had three fever spikes intrapartum. On further investigations, complete blood count, renal parameters, serum electrolytes, and thyroid profile were found to be within normal limits. The cervical swab culture was reported to be sterile. Urine chemistry was within normal limits. On microscopy of the urine sample, no pus cells were seen and the sample was subjected to routine culture on Cystine Lactose Electrolyte Deficient medium (Himedia, Mumbai) which showed mucoid lactose fermenting colonies with a colony count of 10^5 colony forming units per ml of urine after overnight incubation. The organism was identified as *K. variicola* by MALDI-TOF MS (VITEK® MS, BioMérieux) (Matrix Associated Laser Desorption Ionisation - Time of Flight Mass Spectrometry), and biochemical tests revealed –Indole was not produced, citrate was utilized as a sole source of carbon, urea was hydrolyzed by urease enzyme to ammonia, lysine was decarboxylated, Kligler Iron Agar showed Acidic slant and Acidic butt with abundant gas and no Hydrogen Sulfide.

The antibiotic susceptibility testing was done as per the disc diffusion method. (CLSI, Clinical Laboratory Standards Institute, 2022). It was susceptible to amikacin(30µg), ceftriaxone(30µg), ceftazidime (30µg),cefoperazone-sulbactam(75/30 µg),piperacillin-tazobactam (100/10µg),meropenem(10µg) and ciprofloxacin(5µg).

She was empirically started on ceftriaxone and subsequently based on antibiotic susceptibility testing she received an injection of amikacin 12 hourly after the test dose for five days. A repeat sample sent after 7 days was reported sterile.

She underwent spontaneous vaginal delivery the next day of admission uneventfully and the baby cried immediately after birth with an APGAR (appearance, pulse, grimace, activity, respiration) score of 8-9. Postnatal she was afebrile, her vitals were stable, and the baby was active. She was discharged after 8 days with advice for exclusive breastfeeding for 6 months and immunization, to review in the postnatal clinic after 6 weeks, and to review in obstetrics and gynecology casualty in case of emergency. She was also advised ferrous sulfate 200mg and calcium 500mg for 6 weeks.

DISCUSSION

K variicola was reported by Rosenblueth and colleagues in the year 2004 (5). It is difficult to classify the members of this complex due to similar biochemical and phenotypic features. Hence, they are typically misassigned under *K. pneumoniae* (4).

The K. pneumoniae complex comprising bacterial species can be distinguished using MALDI-TOF MS and genome sequencing.

K variicola is noted for producing round, convex, and mucoid colonies. This bacterium can colonize a wide range of hosts, including plants, animals, and insects. One characteristic feature is their ability to fix nitrogen, not ferment adonitol (which differentiates it from *K. pneumoniae*) but ferment rhamnose. They show intrinsic resistance to ampicillin and carbenicillin but show susceptibility in the presence of Beta-lactamase inhibitors(5). *K.variicola* shows a similar antibiotic susceptibility pattern.

The estimated prevalence of K. *variicola* exhibits significant variability. Clinically, *K variicola* is known to cause various healthcare-associated infections and community-acquired infections. It can infect various systems in the human body like the bloodstream, respiratory tract, and urinary tract as it is an opportunistic pathogen.

A study done at the University of Kentucky in the United States by Long Wesley et al., in 2017, demonstrated the isolation of *K.variicola* in four urine samples out of which one was associated with morbidity(3).

Another study done by Campos et al.,2021 in a Brazilian Hospital illustrated the isolation of biofilm production and antimicrobial resistance patterns of *K.variicola* from two urine cultures of elderly female patients and one catheterized male patient(2).

The isolate described here could be identified accurately with the help of MALDI-TOF MS. Accurate identification is the key to its appropriate treatment in line with the Antimicrobial Stewardship as a combination of BL-BLI such as amoxicillin-clavulanate will be effective in this case rather than using a higher class of antibiotics.

CONCLUSION:

This emerging pathogen may easily be overlooked and be typified as Klebsiella pneumoniae and only a high degree of suspicion will lead one to the correct identification in the absence of MALDI-TOF MS.

Conflicts of interest: None

Consent for publication: Informed consent was taken from the legal guardian (parents)of the patient. The patient party was explained that the names and initials will not be published and due efforts will be made to conceal the identity.

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