Streptococcus dysgalactiae subspecies *dysgalactiae* as a cause of urinary tract infection in a diabetic woman: A case report and review of literature

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Summary

Group C Streptococci comprises of *Streptococcus dysgalatiae* that is further divided into two subspecies, namely *S. dysgalactiae* subspecies *equisimilis* and *S. dysgalactiae* subspecies *dysgalactiae*. *S. dysgalactiae* subspecies *dysgalactiae* is mainly an animal pathogen but few cases of human infections have been described in the literature. A 40 year old patient presented to the hospital with complaints of pain in pelvis and suprapubic area. Urine sample of the patient was subjected to microscopy and culture for isolation and identification of the etiological agent. *S. dysgalactiae* subspecies *dysgalactiae* was identified from the clinical specimen of the patient by conventional and automated methods. The patient was successfully treated with third generation cephalosporin. With newer or rarely reported pathogens causing human diseases and increase in number of immunocompromised individuals in the population, the pathogenic potential of such isolates should not be undermined and a careful correlation with the clinical profile should help guide a clinician in optimum treatment of the patient.

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Introduction

Group C Streptococci comprises of *Streptococcus dysgalatiae* that is further divided into two subspecies, namely *S. dysgalactiae* subsp. *equisimilis* (SDSE) and *S. dysgalactiae* subsp. *dysgalactiae* (SDSD) (1). SDSE exhibits distinct Lancefield group antigens C and G whereas SDSD exhibits antigen C and L (2). SDSD is mainly a pathogen of animals but human infections have been reported on rare occasions in the literature. A literature search on PubMed using the search term "((Streptococcus dysgalactiae) AND (subspecies dysgalactiae)) NOT (subspecies equisimilis)" helped us identify five reports of SDSD infections in humans (1-5). Here, we present a rare case of a patient that was diagnosed with SDSD urinary tract infection (UTI) and treated for the same at our hospital.

Case description

A 40-years-old female visited the out patient department of our tertiary care center with complaints of pain in pelvic and suprapubic region, over the past few weeks, which was insidious in onset, not associated with vaginal discharge. The patient also experienced occasional episodes of pain in abdomen. Her menstrual history was insignificant and ruled out pregnancy. The patient was married, having kids and had no history of contact with multiple partners. There was no past medical history or history of instrumentation or surgical intervention. On examination, the patient reported slight tenderness in the suprapubic area but there was no guarding or rigidity in the abdomen. No organomegaly was detected upon physical examination. Her body temperature was 38.3°C, total leucocyte count was elevated (17300/µL).

The radiological investigations included Ultrasonography (USG) of the abdomen and X-ray of the pelvis and lumbar spine. While the x-rays were normal, there was evidence of hepatomegaly with coarsened texture of liver parenchyma and periportal echogenicity around the left portal vein. Kidneys and urinary tract showed no abnormality on USG. Liver function tests were

performed and all parameters were within normal range. Hemogram was normal but the patient was diabetic with a fasting blood sugar level of 9.56 mmol/L (diabetic status not known previously to the patient). PAP (Papanicolaou) smear sent to the pathology laboratory for cytological examination was normal.

Patient's urine sample was collected in a sterile, screw capped universal container and transported to the Microbiology laboratory within 15 minutes at room temperature in a sample transport container. On microscopic examination, there were 4-5 pus cells per high power field (40x) that confirmed the presence of pyuria. Ketones, sugar and protein not detected on routine examination. Urine culture was done on Chromogenic UTI agar (HiCHROM Media, HiMedia Laboratories, India) and was incubated aerobically at 37°C. Culture showed a confluent growth of large, opaque, colourless colonies with slight blue tint after overnight incubation. The colony count of the bacterial colonies was $>10^5$ per ml of urine sample.

An isolated colony was picked up and catalase test was performed using 3% H_2O_2 which was negative. Gram's stained smear prepared from a colony showed Gram positive cocci (GPC) in short chains. A subculture was performed on 5% sheep blood agar (HiMedia Laboratories, India) and Chocolate agar (HiMedia Laboratories, India). A disc of bacitracin and optochin were placed on the blood agar plate. Large, alpha-hemolytic colonies were demonstrated on blood agar after overnight incubation at 37°C under aerobic conditions and no zone of inhibition was present around the bacitracin and optochin discs. Further, on the day identification was done using an automated microbial identification system (MicroScan WalkAway 96 Plus, Beckman Coulter Inc, CA, USA). Also, phenotypic identification tests viz. bile solubility and Christie-Atkins-Munch-Peterson (CAMP) test were also put up to aid in identification.

Bile solubility and CAMP tests were negative. The isolate was identified as *S. dysgalactiae* subsp. *dysgalactiae* by the automated system. The patient was treated with a trial of oral cefexime 400mg/day for 10 days. Repeat urine culture was negative after four weeks and clinical resolution of the patient's illness was achieved.

Discussion

S. dysgalactiae was divided into two subsp. *i.e.* SDSE and SDSD in 1996 by Vandamme on the basis of their host preferences (6). SDSE is mainly a human pathogen whereas SDSD primarily infects animals (1), is known to cause bovine mastitis and has been isolated from milk (7). Few cases of SDSD associated human infections have been described before. A review of available literature is presented in Table 1.

In all the cases, the typical patient profile was a middle aged or elderly patient with history of contact with animal, and an immunocompromised state as a result of past medical condition or drugs. The zoonotic potential of SDSD human infections has previously been demonstrated by Alves-Borroco *et al.* (7) using human respiratory cells and adult zebrafish animal model. The study showed that SDSD was able to internalize and cause infection in both human cells *in vitro* as well as zebrafish *in vivo*. Rodrigues *et al.* (8) had previously shown that SDSD isolates from bovine milk udders containing the phage encoded GAS genes were capable of infecting human keratinocytes *in vitro*.

Owing to the need of faster diagnosis, many laboratories use newer culture media formulations such as chromogenic media, followed by identification and Antimicrobial Susceptibility Testing (AST) by automated methods. However, it is essential to perform haemolysis testing on blood agar for *Streptococcus* spp. isolates. The susceptibility to benzylpenicillin on AST is used to predict the susceptibility of the isolate to penicillins and other beta lactam antibiotics including cephalosporins (9). As the non susceptible isolates are rare, patients are usually treated with a trial of penicillin or cephalosporin (9). The use of these antibiotics in animal meat and dairy industry raises concerns of anti microbial resistance (10).

The western part of Rajasthan is a desert area that largely relies on tourism and agricultural and livestock activities for sustaining majority of the households (11). Zoonotic diseases such as brucellosis are prevalent in this area owing to close contact with animals, consumption of unpasteurized or unboiled milk and dairy products (12). Although we could not reliably ascertain the history of close contact in the patient, the acquisition of infection from an infected animal could not be ruled out owing to agricultural background and her eating habits. Lastly, the lack of advanced diagnostic modalities in majority of the laboratories in a developing country like ours makes the management of rare entities like these a challenge.

Conclusions

With newer or rarely reported pathogens causing human diseases and increase in number of immunocompromised individuals in the population, the pathogenic potential of such

Table 1. Review of the literature.

Year	Authors	Patient age/Gender	Site	History/Risk factors	Outcome
2009	Koh *et al.*[4]	48 years/Female	Cellulitis of right arm and breast	Trauma from fin of a fish	Recovered
2012	Park *et al.*[1]	61 years/Male	Right knee with prosthetic joint infection	Surgery. No documented history suggesting zoonoses	Recovered
2014	Jordal *et al.*3	65 years/Male	Infective endocarditis with septic embolization to brain and left shoulder	Malignant tumor of rectum. No documented history suggesting zoonoses	Recovered
2018	Chennapragada *et al.*[2]	49 years/Female	Left lower limb cellulitis and bacteremia	No clear history identified. Possible exposure to a domesticated dog	Improved
2019	Koh *et al.*[5]	48 years/Female* Two more female patients	Ascending cellulitis in all three patients with breast cancer	One patient had trauma from fish. One patient was a chicken handler. No information on third patient	No information available

*Same patient as reported by Park et al in 2012 (first study in this table).

zoonotic isolates should not be undermined and a careful correlation with the clinical profile should help guide a clinician in optimum treatment of the patient. A collaborative network of emerging institutes with a reference institute having advanced diagnostic facilities is the need of the hour in developing countries.

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