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A case of perinephric abscess in a child with diabetes mellitus: A rare manifestation of group B Streptococcal infection

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ABSTRACT

Perinephric abscess is an uncommon infection in children, but it is usually caused by *Escherichia coli*, *Staphylococcus aureus*, *Proteus mirabilis* and *Pseudomonas aeruginosa*. Group B Streptococcus (GBS) is an uncommon cause of perinephric abscess or serious bacterial infections beyond the neonatal period. Comorbid conditions such as diabetes mellitus and immunosuppression can increase the risk of GBS invasive disease. We describe a 10-year-old female who presented with 1-month of right-sided flank pain and swelling with ultrasound showing large (>3 cm) right perinephric and subcutaneous abscesses. She was additionally diagnosed with new onset type 2 diabetes mellitus (DM) during admission. Abscess cultures obtained after placement of two percutaneous drains and the initiation of broad-spectrum intravenous antibiotics grew beta-hemolytic GBS. Here, we present to our knowledge, the first known documented case of GBS perinephric abscess in a school-aged child with DM. Much of the knowledge of perinephric abscess management is extrapolated from adults, therefore making optimal treatment in the pediatric population challenging. We propose that GBS be considered in the etiology of perinephric abscess in children with DM and other immunosuppressing conditions. In addition, percutaneous drainage of larger abscesses (>3 cm) in conjunction with antibiotic therapy is a reasonable management strategy.

Key Words: Perinephric abscess, diabetes mellitus, group B Streptococcus infection, child.

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Introduction

Group B Streptococcus (GBS), known as *Streptococcus agalactiae*, is a gram-positive organism mostly associated with infections in neonates and infants. The most common manifestations occur as bacteremia, meningitis, and skin/soft tissue infections [1].

Evidence of GBS infections occurring beyond 90 days of life exists in case reports including a 3-year-old male with GBS retropharyngeal abscess and a 5-year-old female with fatal hemophagocytic lymphohistiocytosis due to GBS sepsis [2,3].

Perinephric and renal abscesses are uncommon in children but are usually associated with abnormal urinary tract anatomy and a history of repeated urinary tract infections (UTI). Hematogenous seeding has also been noted to occur. Overall incidence data ranges from 1 to 10 cases per 10,000 hospital admissions [4-8]. *Escherichia coli, Staphylococcus aureus, Proteus mirabilis,* and *Pseudomonas aeruginosa*, are the most common etiologies for pediatric and adult patients [4-6,8]. Few cases of intraabdominal abscess due to GBS exist in the literature, and no cases of perinephric abscess due to GBS in a pediatric patient have been published to date [5,9]. Therefore, we present the case of GBS-induced perinephric abscess in a child with DM due to its rarity, features in diagnosis and treatment.

Case report

A 10-year-old female with asthma presented with a one-month history of right-sided flank pain and swelling. She reported subjective fevers, no chills, and denied dysuria and hematuria. Her parents endorsed polyuria, polydipsia, and a 45-pound weight loss over 3 months. They denied any previous UTIs.

On presentation, her vital signs showed a temperature of 38.5°C, pulse of 132 beats per minute, respirations of 30 per minute, and blood pressure of 157/83 mmHg. Her BMI of 30.3 kg/m^2 put her at the 99th percentile, consistent with obesity. On exam there was a large area of tender erythema and induration over the right posterolateral flank. Acanthosis nigricans was also noted.

Laboratory results showed a total leukocyte count of 12,800 per µL with 70% neutrophils, 5% bands, 19% lymphocytes, 6% monocytes, hemoglobin (Hgb) of 9.4 g/dL and a platelet count of 358 x10^3/µL. A metabolic panel showed glucose of 309 mg/dL with all other values within normal limits. Hemoglobin A1c (HbA1c) was 13.2%, C-reactive peptide (CRP) was greater than the upper limit of 270 mg/L, and urinalysis showed 3+ glucose, 2+ ketones, and negative leukocyte esterase and nitrites. Serum β-hydroxybutyrate was elevated to 2.20 mmol/L. Blood culture collected before the initiation of broad-spectrum antibiotics was negative, and a midstream urine culture was positive for 1000 CFU of *Staphylococcus epidermidis* (deemed a contaminant). An abdominal ultrasound showed a heterogeneous area measuring 9.8x6.5x8.3 cm present in the subcutaneous tissue and uncertain extension into the right renal parenchyma. Computed tomography (CT) of the abdomen revealed a loculated right perinephric abscess measuring 4.9x2.5x4.4 cm communicating with a larger loculated 7.5x4.7x11 cm collection in the thoracic and abdominal walls (Fig. 1).

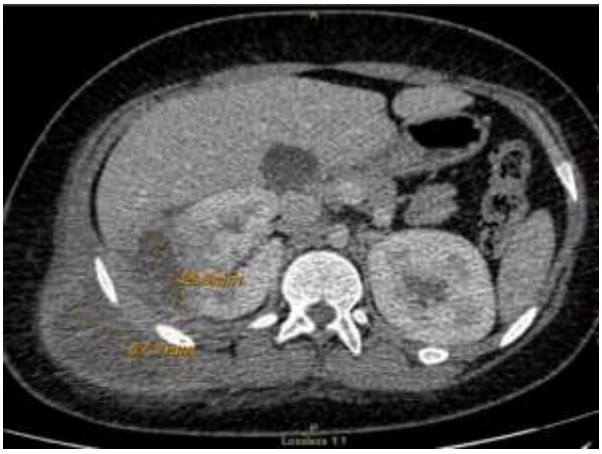

Fig. 1. Abdominal computed tomography demonstrating loculated right perinephric abscess measuring communicating with a larger loculated collection in the thoracic and abdominal walls.

The patient underwent percutaneous drain placement with a 12 F pigtail drain placed in the subcutaneous abscess and a 10 F in the perinephric abscess which yielded a total of 150 cc of purulent fluid from both collections immediately after the procedure. Four hours prior to the procedure, she received 2g of intravenous (IV) ceftazidime and 500 mg of IV metronidazole with 1g of IV vancomycin added after abscess culture collection. Once abscess cultures returned positive for 4+ GBS, treatment was deescalated to monotherapy with 2 g of IV ampicillin every 6 hours. All antibiotic doses were calculated based on her weight of 80 kg.

During hospitalization, the patient remained stable and received serial ultrasounds to assess the success of percutaneous drainage. Complications arose around drain output and leakage around the drain site and were managed with thrice daily flushes with tissue plasminogen activator and drain revision. She defervesced and her CRP normalized. Her blood glucose was managed with a sliding scale insulin regimen. Islet cell autoantigen (ICA) 512 was negative and she was therefore believed to have type 2 DM. She was transitioned to oral amoxicillin 875 mg three times daily after 10 days of IV therapy. After a 17-day hospitalization, her drain output was consistently less than 50 cc/24 hours, and after training on home drain care for her family she was discharged to complete a total of 21 days of therapy from the date of drain revision. Outpatient follow-up was arranged for management of her diabetes, blood pressure, and drain care.

One-week post-discharge, she was readmitted due to a one-day history of fever to 103°F. Only the subcutaneous drain remained intact, as the perinephric abscess drain came out at home 2 days prior. A CT scan revealed near-complete resolution of the perinephric abscess but persistence of a subcutaneous phlegmon. Culture of this fluid grew *Enterobacter cloacae*, *Stenotrophomonas maltophilia*, and *Pseudomonas flourescens*. Ceftriaxone was started at 2 g every 24 hours and then switched to trimethoprim-sulfamethoxazole (TMP-SMX) 160 mg twice daily based on susceptibilities. Her subcutaneous drain was removed, and after 4 days, she was discharged home on amoxicillin (to complete therapy for GBS) and TMP-SMX. She completed a total of 4 weeks of antibiotics, and at clinic follow-up 2 months later, she was asymptomatic and doing well. Follow-up renal ultrasound showed only residual perinephric fluid.

Discussion

Clinical presentation of perinephric abscess in children occurs with or without fever, dysuria, and abdominal pain or flank pain [4-6,10]. Laboratory evaluation can reveal elevated CRP and erythrocyte sedimentation rate, leukocytosis and anemia; urinalysis and renal function results vary depending on abscess communication with the collecting system of the kidney [4,7,10]. Imaging consists of an initial ultrasound to visualize the fluid; however, abdominal CT scan is the best modality for the diagnosis and determination of the size and extent of expansion of the abscess [7,10].

A contemporary retrospective analysis of 16 pediatric patients by Linder et al. [6] indicates scarce data regarding the optimal management of children with perinephric abscess. The results of their study promote conservative management with IV antibiotics for abscesses < 3 cm in diameter and make mention of an additional case series where lesions >3 cm have been managed with percutaneous and open surgical drainage [6,10]. Percutaneous

drainage is minimally invasive and appears to be fundamental in identifying the pathogen as urine and blood cultures are positive in less than half the cases in the adult population [9].

With a paucity of information on GBS disease in children beyond 3 months of age, our case suggests that greater consideration of this pathogen should be given in pediatric infections especially as worldwide incidence rates of GBS infections are increasing [1,11-13]. The increase noted in adult populations coincides with increasing rates of comorbidities, especially type 2 diabetes [1,9,12,13]. As diabetes incidence also increases in children, we may expect to see a greater incidence of its complications including the infectious etiologies typically seen in the adult population [14,15].

Our case is relevant because, as in a case report by Garcia et al. [9] which describes perinephric abscess in a 61-year old diabetic patient, we reinforce the potential association between GBS infections and DM. Furthermore, we also demonstrated successful treatment of a multiloculated perinephric abscess with percutaneous drainage as opposed to open surgical drainage employed in other studies [9,10]. Percutaneous drainage may reduce morbidity in patients with DM and potentially reduce the length of hospitalization [9]. Our patient was discharged home with percutaneous drains, and this could be a viable option with other pediatric patients. Percutaneous drainage allowed for optimal pathogen-directed therapy. Lastly, our case highlights GBS as a potential pathogen in perinephric abscess a may not be commonly seen outside of the neonatal population. It deserves recognition as a potential etiology of perinephric abscess especially in patients who are at increased risk with relative or absolute immunocompromised.

Our case is limited in that our patient did not have a voiding cystourethrogram (VCUG) to completely rule out anatomic abnormalities of her urinary tract. Her serial ultrasounds were negative for hydronephrosis which was taken as objective evidence for the absence of such abnormalities. Further limitation identified is the choice of antibiotic therapy following her initial hospital discharge. Monotherapy with amoxicillin was selected based on the pure growth of GBS from the abscess culture. While gram-negative rods did not grow in the initial cultures, sending the patient home on broader therapy may have been prudent given the complexity of her infection.

Pediatric patients with perinephric abscess and DM represent a unique population. Source control is key to controlling the infection and increasing the likelihood of successful antibiotic treatment. Empiric antibiotics should cover GBS in addition to the more common causes of perinephric abscess in children. Follow-up imaging is key to ensure complete resolution of perinephric abscess. Optimal duration of antibiotic therapy is unknown however continuing treatment until radiographic resolution has been shown to be successful [5,6]. Conservative management with antibiotics alone for lesions <3 cm and percutaneous or open surgical drainage for those >3 cm in diameter along with antibiotics have been shown to be successful in managing perinephric abscess in both adults and children [6,10]. Further study is required to formulate more concrete guidelines for the management of perinephric abscess in children, but its rarity makes this challenging.

Compliance with ethical statements

Conflicts of Interest: None.

Financial disclosure: None.

Consent: Informed and written consent were taken from patient and her parents to publish this case report.

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