CASE REPORT

SHIGELLEMIA IN A CHILD WITH GASTROENTERITIS: A CASE REPORT AND REVIEW OF MICROBIOLOGY AND MANAGEMENT

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ABSTRACT

Shigellemia is a rare entity of sepsis encountered in individuals having gastroenteritis caused by *shigella* spp. It is reported to be common in infants, immunocompromised, those having chronic illnesses and post-transplant patients on immunosuppressants. We present a case of a two and half year-old child who developed sepsis like illness during recovery from gastroenteritis. *Shigella* spp was isolated from blood culture and he responded well to oral antibiotics. This case illustrates the importance of blood and stool cultures that need to be sent in every febrile gastroenteritis case irrespective of immune status. Early detection and prompt treatment will likely improve outcome.

Keywords: Shigellemia, Gastroenteritis, Child

BACKGROUND

One of the major causes of childhood mortality is diarrheal diseases. Diarrhea related deaths in children are estimated to be 2 million, most of whom are under 5 years of age.[1,2] This preventable disease has astonishingly increased risk of mortality in children with severe malnutrition and sepsis which are also common in our setup.[1-8] Blood and stool cultures are often not done routinely in Pakistan as it could improve etiologic diagnosis. Pathogenic enteric isolates can be isolated in acute gastroenteritis (GE).

The burden of shigellosis is high in resource-poor countries. Multiple studies in Pakistan have documented the importance of *Shigella* as an important etiologic agent in GE. A study from Aga Khan University Hospital of 6670 stool samples from children and adults showed *Shigella flexneri* in 6% samples.[3] Similarly a prospective, population-based study in six Asian countries (including Pakistan) in >600,000 persons of all ages showed *Shigella* species in 2,927 (5%) of 56,958 diarrhea episodes with *Shigella flexneri* being the most frequently isolated.[4] We report here a child with dysentery and *Shigella spp.* blood stream infection (shigellemia) and discuss its importance of epidemiology, diagnosis and treatment.

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CASE REPORT

A two and half year-old male child resident of Kashmir presented in outpatient clinic with history of loose bloody motions 2 weeks ago which was treated by a local pediatrician with metronidazole after which his loose stool improved. However, the child continued to have decreased appetite, low-grade fever, foul smelling stool and a vesicular rash. He was born to non-consanguineous parents at full term uneventfully. He had regular follow up visits to our clinic for routine checkup and immunization. He had age-appropriate development. He was well fed and his height and weight were falling in normal range on centiles chart. His immunization status was up-to-date. He had no history of any past major illness or hospitalization.

On examination the child had weight of 12.5 kg, height of 88 cm, head circumference of 48 cm, pulse 120/minute and temperature of 37C˚. On systemic examination the child was comfortable, with no obvious distress but had pallor. Ear, nose and throat examination was normal. Abdominal examination showed soft non-tender abdomen with no distention and positive bowel sounds. Rest of systemic examination was unremarkable. Clinical impression of dysentery was made.

Laboratory reports showed: Hemoglobin of 10.30 g/dL, hematocrit 32.4%, White Blood Cell count of 14700/µL with Neutrophil 41%, Lymphocyte 45%, Monocytes 10%, and platelet count of 401000/µL, C-reactive protein 6.1 mg/L, alanine transaminase (ALT) 37 U/L, aspartate aminotransferase (AST) 48 U/L, serum albumin 3.93 mg/dL, serum creatinine 0.45 mg/dL and serum calcium of 9.6 mg/dL. Stool routine examination was negative for gross blood, mucus, ova,

cyst, worms and red blood cells but there were 2 WBC's/high power field. On third day blood culture showed growth of gram-negative rods, that later was verified as *Shigella* spp. susceptible to cefixime, ciprofloxacin, ceftriaxone, co-trimoxazole and was resistant to ampicillin and chloramphenicol.

The child was given intravenous ceftriaxone for 5 days and followed by oral cefexime for another 5 days. On 8th day of antibiotic parents told on telephonic inquiry that the child's general conditions had improved, was afebrile for the last 4-5 days and resolution of his anorexia and diarrhea. A follow-up at one month revealed that the child was well and had no further new symptoms.

DISCUSSION

Shigella remains an important public health problem and is the second commonest cause of morbidity and mortality accounting for upto 13% of all diarrheal deaths worldwide.[9] It is responsible for most deaths in children less than five-year-old especially malnourished in low-income countries.[9] Septicemia with *shigella* spp is a rare entity reported in literature but shigella gastroenteritis also called shigellosis or dysentery is a common illness.[4] In shigellosis there is invasion of gastrointestinal tract and infection often remains confined to gastrointestinal tract. Shigellosis prevention is difficult because only few organisms are required to cause the infection. Shigellosis is a public health problem and may be a self-limiting illness that usually resolves in about 14 days.[1,3,4]

Invasive diseases by *shigella* are rare except in immunocompromised patients, post-transplant patients and chronically malnourished children and its mechanism is unclear.[2,4] Septicemia with *shigella* is reported to occur in upto 4% among more than 2000 patients having shigellosis as underlying diagnosis.[10] These patients had significantly more severe manifestations such as dehydration, abdominal tenderness, lethargy, renal failure, leukocytosis and other hematologic findings compared to non-bacteremia patients. These bacteremic patients were also twice as likely to die as well with highest risk for infants less than one-year olds who were malnourished, non-breast fed or were afebrile at presentation.[10] Among children *Shigella* blood stream infection has been reported in literature mainly in infants.[11-14] Other vulnerable populations are also at increased risk such as travelers,[15] acquired immunodeficiency syndrome (AIDS)[16] and transplant patients.[17]

In Pakistan shigellemia has been reported in couple of case series and reports.[18,19] A study from Lahore reported among 45 patients with malignancy shigellemia in 4 (8.8%) patients including three children.[19] All of these were due to *shigella flexneri* and most isolates were susceptible to third generation cephalosporins. None of these patients died. Commonest species causing sepsis is *shigella flexneri* and the most virulent as well.[4]

Shigella resistant strains appears to have emerged over last few decades. A prospective, population-based study in six Asian countries (including Pakistan) was done in >600,000 persons of all ages showed *Shigella* species in 2,927 (5%) of 56,958 diarrhea episodes.[4] *Shigella flexneri* was the most frequently isolated. The majority of *Shigella flexneri* isolates in each site was resistant to amoxicillin and cotrimoxazole. Ciprofloxacin-resistant *Shigella flexneri* isolates were also identified including from Pakistan (3%).[4] Several resistant species from stool cultures are isolated from Pakistan reported in other studies.[5-7] One study from Karachi reported *shigella flexneri* to be the commonest species of *shigella* isolated.[5] It also showed that 100% were susceptible to nalidixic acid, 4% to ampicillin and 7% to co-trimoxazole.[5] Another study from the same city reported co-trimoxazole resistance of 56-89%, ampicillin resistance of 4-87% and no resistance to nalidixic acid was identified.[7] A cross-sectional study from slum areas in Karachi in children with gastroenteritis showed isolation rate of 4% (193/4688 stool samples) for *Shigella species* (*Shigella flexneri* 58%, *Shigella sonnei* 16%, *Shigella boydii* 15% and *Shigella dysenteriae* 11%).[6] All isolates were susceptible to ofloxacin and ceftriaxone. However, resistance was high to commonly used antibiotics (cotrimoxazole 88%, ampicillin 56% and nalidixic acid 39%). Another study from in Karachi in 2002-4 in which resistance to cotrimoxazole was 56-89%, ampicillin 4-87% but nalidixic acid was 0%.[7] A more recent study from Karachi in 199 different samples of *S. flexneri* showed high level of multiple drug resistant strains particularly serotype 2b.[20] All these isolates showed high resistance to amoxicillin/clavulanic acid (100%), quinolones (74.6%) and trimethoprim-sulphamethaxazole (54.4%). Also, multiple resistant genes were reported including *bla*OXA gene. [20] Multiple resistant isolates to trimethoprim-

sulphamethaxazole, cephalosporins, ciprofloxacin and azithromycin have also been reported from other parts of the world and is now part of the high priority so called "GLASS" pathogens.[21] Thus treatment options are becoming limited in cases of severe dysentery due to *Shigella*.

Shigellemia needs to be treated aggressively with appropriate antibiotics and fluid rehydration. Appropriate antibiotics therapy shortens the duration of illness, microorganism shedding as well as it reduces complications. Local resistance patterns should dictate empirical therapy. Recommended antibiotics include cephalosporins, ciprofloxacin and azithromycin. Current WHO guidelines continue to support the use of fluoroquinolones (first-line), β-lactams (second-line) and cephalosporins (second-line). Azithromycin is appropriate as a second-line therapy in regions where the rate of non-susceptibility of ciprofloxacin is known to be high.[22] A systemic review and meta-analysis in children also is in line with the WHO recommendations as well.[23] Our case responded well to cephalosporins to which the organism was susceptible. Outcome is good if diagnosis is suspected early and therapy initiated early. A high mortality rate has been associated with shigellosis including shigellemia.[9]

CONCLUSION

In summary Shigellemia is a rare entity of septicemia but always should be included in the differential of clinical sepsis associated with or followed by dysentery. Symptoms like poor appetite and fever after gastroenteritis not responding to other antibiotics should be investigated for associated underling septicemia. Sending blood and stool cultures should be an integral part of managing any febrile gastroenteritis. Early and accurate diagnosis can avoid morbidity and mortality associated with this condition.

CONFLICT OF INTEREST

There is no conflict of interest to declare by any authors.

AUTHOR CONTRIBUTION

Hamza Khan: Data acquisition, literature review, initial and final draft

Inayat Ullah: Data acquisition, literature review, initial and final draft

Ejaz Ahmed Khan: Conception, literature and data analysis, final draft

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