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ORIGINAL ARTICLE

Frequency and Etiology of Peritonitis in Pediatric Nephrotic Syndrome

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ABSTRACT

Objective: To determine the frequency and etiology of peritonitis in pediatric nephrotic syndrome

Study Design: Cross sectional descriptive study.

Place and Duration of Study: This study was conducted in the Department of Nephrology, Children Hospital & the Institute of Child Health, Multan from 1st July to 31st December 2017.

Material and Methods: One hundred and fifty two admitted patients of nephrotic syndrome between ages 1-10 years with normal renal functions were included in the study. All of them were evaluated for detailed history, clinical examination and laboratory investigations. Spontaneous bacterial peritonitis was our primary clinical diagnosis with aid of blood and ascitic fluid laboratory analysis.

Results: The frequency of spontaneous bacterial peritonitis was 27%. The mean age of patients was 6.2 +5.8 years and male to female ratio was 2:1. Patients diagnosed with peritonitis presented with abdominal pain and tenderness (95%), fever (93%) and vomiting (73%). Streptococcus pneumoniae was isolated in 19% and Escherichia coli in 7% children. Blood cultures were positive in (29%) patients of peritonitis while ascitic fluid culture was positive in 27%.

Conclusion: Frequency of spontaneous bacterial peritonitis in pediatric nephrotic syndrome is 27% with male predominance. Ascitic fluid culture is positive in 27% children with peritonitis revealing pneumococcus as the most common offending agent.

Key Words: *Nephrotic syndrome, Peritonitis, Ascitic fluid*

INTRODUCTION

Nephrotic syndrome (NS) is characterized by proteinuria, hypoalbuminemia, hypercholesterolemia and edema. Its incidence is 2-3 children/100000 population per year in western countries while in sub-continent it is 9-10 children/100000 population per year.[1,2] The increased risk of infectious complications is well documented in children with nephrotic syndrome especially the invasive primary peritonitis. Streptococcus pneumoniae has been recognized as the most common pathogen responsible for peritonitis among these patients.[3] However with the advent of antibiotics and steroid therapy, Escherichia coli is another significant offending agent possible for primary peritonitis.[4,5]

Nephrotic syndrome is primarily a pediatric renal disorder and it is 15 times more common in pediatric age group than adults. Approximately 80% to 90% of NS cases in adults are idiopathic.[6]

Majority of children present with the most common form of nephrotic syndrome which is idiopathic nephrotic syndrome.[7] It accounts for 80%-90% cases of childhood nephrotic syndrome while the remaining 10%-20% cases are secondary nephrotic syndrome either related to systemic or glomerular diseases.[8,9] According to the international study of kidney diseases in childhood (ISKDC), 84.5% of all children with primary nephrotic syndrome suffered from minimal change nephrotic syndrome (MCNS), 9.5% had focal segmental glomerulosclerosis (FSGS), 2.5% had mesangial proliferation and 3.5% had membranous nephropathy or another cause of disease.[10]

MATERIAL AND METHODS

Patients of nephrotic syndrome admitted in Department of Nephrology between age 1-10 years with normal renal functions were included in the study. Detailed history was taken with special emphasis on edema, fever, vomiting, urinary complaints, abdominal distension and pain. Thorough abdominal examination was done for fluid thrill, shifting dullness, abdominal rebound tenderness and bowel sounds. The patients having clinical signs of peritonitis underwent the diagnostic peritoneal tap after taking informed consent. Patients were placed flat and point of maximum dullness was marked by percussion of abdomen. Skin was cleaned. Local anesthesia with 1% lidocaine was given. Fluid was drawn by inserting 21 gauge needle on a 20 ml syringe into the peritoneal cavity. Needle was removed after taking the peritoneal fluid and antiseptic dressing was applied. This ascitic fluid was sent to the laboratory after proper labeling and peritoneal fluid culture or counter immune-electrophoresis test for bacterial antigen of peritoneal fluid was done. Peritonitis was defined as either proven or clinical. To satisfy the criteria for proven peritonitis, clinical signs of peritoneal inflammation had to be present in combination with one or more of the following: (1) positive peritoneal fluid culture or counter immune-electrophoresis test for bacterial antigen of peritoneal fluid; (2) positive blood culture, or (3) >50 polymorphonuclear cells or cloudy peritoneal fluid. The blood cultures of the patients were sent at the same time to the department of pathology. Complete blood count was also performed for white cell count. All the data was compiled and entered in a special proforma.

The collected data was analyzed by SPSS 10.0. Frequency and percentages were calculated for categorical variables like sign**s** and symptoms of peritonitis in nephrotic syndrome, sex of patients and different organisms isolated on culture. Mean and standard deviation were calculated for quantitative variables like age. Student t test and chi square were applied and p value ≤ 0.05 was considered as significant.

RESULTS

In our study 152 children with nephrotic syndrome were included. The mean age of patients was 6.2 $\pm$ 5.8 years. One hundred and one children were male while 51 were female with ratio of 2:1 (table 1). Forty one children were identified to have spontaneous bacterial peritonitis with a frequency of 27%. The major clinical symptoms of patients with peritonitis were abdominal pain and tenderness in 39/41 (95.1%), fever in 38/41 (92.7%), rebound tenderness in 37/41 (90.2%) and vomiting in 30/41 (73.2%). The ascitic tap performed showed a mean value of 0.782 ± 0.137 g/dl and 51.219 ± 7.185 mg/dl for proteins and glucose respectively (table 2). The mean white blood cell count in ascitic fluid was 567.46 ± 141.99 per mm^3 and neutrophil count was 449.02 ± 106.46 per mm^3. In 41 patients with peritonitis, blood culture was positive in 12/41 (29.3%) while gram staining and cultures of ascitic fluid were positive in 30/41 (73%) and 24/41 (58.5%) respectively. Seventeen out of 41 patients with peritonitis were between 1-5 years, 24 children between 6-9 years and out of 111 cases without peritonitis, 55 patients were between 1-5 years and 56 between 6-9 years with a p-value of 0.376. As compared to 41 patients with peritonitis, fever was observed only in 11 out of 111 cases without peritonitis with a p-value of 0.000. Vomiting was present in 30/41 (73%) cases of peritonitis while no case was observed in those without peritonitis. Out of 41 children with peritonitis, 39 (95.1%) were found to have abdominal pain and tenderness. while abdominal rebound was seen in 37 (90.2%). Three out of 111 cases without peritonitis had ascitic fluid proteins less than 1 gm/dl as compared to 38/41 (92.7%) cases of peritonitis. Twelve out of 41 (29.3%) cases with

peritonitis showed glucose ≥ 50mg/dl in contrast to 5 cases out of 111 patients without peritonitis (table 3). All the 41 patients of peritonitis had neutrophil count 250 cells/mm^3.

TABLE 1: Demographics

Demographic features	Nephrotic with peritonitis	Nephrotic without peritonitis	p-value
Age 1-5 years	17	55	0.376
Age 6-9 years	24	56	
Male	27	77	
Female	14	34	

TABLE 2: Frequency of signs and symptoms of peritonitis

Signs and symptoms	Number	Percentage
Fever	38	95.0
Vomiting	30	73.0
Abdominal pain	39	95.0
Abdominal tenderness	39	95.0
Abdominal rebound	37	90.0

TABLE 3: Ascitic fluid culture and sensitivity findings

Organism	Number of organism	Percentage
Streptococcus pneumoniae	8	19.0
Escherichia Coli	3	07.0
Others	0	00.0

DISCUSSION

In a study conducted in 2004 by Alwadhi,[11] it was reported that frequency of primary peritonitis in nephrotic syndrome was 15.8% while our study described the frequency of spontaneous bacterial peritonitis in nephrotic syndrome to be 27%.

Idiopathic nephrotic syndrome is more prevalent in males than females with 2:1 ratio but after pubertal age group sex incidence becomes equal. Predominance in males with a similar male to female ratio was also observed in our study. Nephrotic syndrome commonly presents between the ages of 2-6 years in contrast to focal segmental sclerosis which is more common in older children of African American or Hispanic origins.[12] The mean age of our children was also the same.

A study was conducted by Churg et al[13] on 62 children and reported frequency of peritonitis as 17.3% of children and Streptococcus pneumoniae was the most common pathogen found involved but enterococcus and anaerobes were also observed. Patients presented with abdominal pain, fever, nausea, vomiting and rebound tenderness. Another study was conducted by Uncu et al[14] on this topic and reported that most common pathogen was Streptococcus hemolyticus and incidence of peritonitis was seen in 2.6% of patients.

A study was completed in 1982 by Krensky et al[15] on pediatric nephrotic syndrome and concluded that Escherichia coli and Streptococcus pneumoniae are two main pathogens that were found in percentage of 25% and 50% respectively in patients of peritonitis in this age group. Tain et al[16] conducted a study on frequency and etiology of peritonitis and reported 8 episodes of peritonitis in 231 patients and most common isolated organism was S. pneumoniae which was observed in four patients.

Another study by Gorensek et al conducted a study on frequency and involved pathogens in acute peritonitis and reported that 50% of nephrotic syndrome in children was observed with peritonitis, among them 38% of patients diagnosed with pneumococcal disease. Infections, especially with encapsulated bacteria (Streptococcus pneumoniae, Haemophilus influenzae), are common in children with nephrotic syndrome due to increased urinary losses of immunoglobulins and properdin factor B, defective T-cell mediated immunity, immunosuppressive therapy, edema, malnutrition, edema and loss of transferrin.[17,18] Spontaneous bacterial peritonitis is the most common type of infection seen in nephrotic syndrome while children may also suffer from frequent episodes of urinary tract infection, cellulitis, pneumonia and sepsis.

Tapaneya-Olarn et al[19] conducted a study for a duration of 20 years and found that gram negative and gram positive bacteria affected equal number of peritonitis in childhood nephrotic syndrome. This study also found that bacterial infections were equally observed in early years of study. Literature shows that peritonitis mostly occurred in early years of nephrotic syndrome.[20]

CONCLUSION

The increased risk of infectious complications among children with nephrotic syndrome is well

documented. Spontaneous bacterial peritonitis is probably the best characterized complication that develops in patients with nephrotic syndrome. This study was conducted to determine the frequence of spontaneous bacterial peritonitis in children with nephrotic syndrome and also the organisms responsible for primary peritonitis. So, we can determine and analyze the recent trends in the bacteriology of primary peritonitis in nephrotic syndrome.

Conflict of interest:

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