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A 13 -YEAR- OLD WITH NEPHROTIC SYNDROME AND STREPTOCOCCAL PNEUMONIA: A CASE STUDY

Nursing

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KEYWORDS

Nephrotic Syndrome

The kidney's function is to filter large amounts of fluids, remove waste products and exchange electrolytes across the cell membrane daily. Any alteration of the renal function that causes an increased glomerular membrane permeability would allow larger plasma proteins such as albumin to pass through the membrane and cause hypoalbuminemia.[1] This occurs because of an increased rate of urinary excretion of albumin and an increased catabolism of the albumin pool. A low level of albumin in the blood and a corresponding high level of protein in the urine are characteristic feature of this diagnosis.[2]

Therefore, nephrotic syndrome is an alteration of renal function due to an increase in the glomerular basement membrane permeability to plasma protein such as albumin. Signs and symptoms include generalized edema (anasarca), weakness, marked or persistent proteinuria and hypoalbuminemia. It is critical to detect and treat this syndrome early as it can lead to thromboembolisms, infections, hyperlipidemia and edema.[2]

Three types of nephrotic syndrome have been identified: primary minimal change nephrotic syndrome (MCNS), secondary, and congenital (CNS).[2]

MCNS is the most common type. It accounts for 80 percent of the cases and occurs at any age, and it's more commonly found in males. The pathogenesis is not yet fully understood; it may be a metabolic, biochemical, or an immune disturbance that causes an increased permeability to proteins.

The secondary type is frequently associated with secondary renal involvement or with systemic diseases. A rare autosomal recessive gene localized on the long arm of chromosome 19 is the cause of CNS.

Patient History & Physical

Kajal was born full-term in Rockland Hospital, Dwarka via a normal vaginal delivery and weighed 2.6 kgs at birth. Immunizations were up to date, and she had a childhood history of bruising easily. Family history included kidney stones, hypertension and diabetes mellitus.

Her first admission at age 13 left her symptom-free for 2 more years. Recently, she had two more admissions and three visits to the SGT Hospital. Her last visit resulted in 8-day admission for fever, left side flank pain, left side chest pain and intermittent vomiting for 3 days.

Admitting diagnoses included acute pyelonephritis, nephrotic syndrome and streptococcal pneumonia. Kajal was awake, alert and oriented on admission with periorbital and pedal edema, abdominal tenderness and distention. Vital signs were 101.9º F temperature, Pulse rate 132beats/min, respiratory rate 20 breaths/min, Blood pressure 110/54 with a pain scale of 6 and weight of 61.2 kgs.

Kajal had many of the expected clinical manifestations listed in Table 1.[3,4]

Significant Diagnostic/Lab Tests

Kajal had a series of tests to determine her diagnosis. The right abdominal and pelvic ultrasound with contrast revealed mild anasarca, ascites, a trace of a pericardial effusion and abnormal bowel loops.

The WBC was 41,000 mm^3 on admission; it climbed to 76,000 mm^3 before decreasing to 65,000 mm3 after the treatment began. The blood cultures showed streptococcus pneuomococcus and a bacteremia with gram-positive dyplococci consistent with pneumonia. The source was most likely to be secondary to a spontaneous peritonitis. She also had oral candidiasis.

Her urinalysis showed a hazy yellow specimen with a specific gravity of >1.03; proteins >300; trace ketones, large blood and a small amount of bilirubin. After 5 days of treatment, the urine was negative for blood and ketones, and the specific gravity was 1.015.

Family and Age-related Issues

As a typical teenager, Kajal was concerned about her appearance, which was altered with edema and could impact her self-esteem. Her new low-sodium diet was a challenge with her food choices. Her family kept bringing inappropriate food from home, which necessitated a lot of diet counselling.

Her diet changes would also impact her lifestyle. Teenagers are usually active with friends after school, but her doctor visits and a decrease in activity level could alter her involvement in after-school activities. For Kajal, a teenager, privacy was another important concern, and the disease also impacted her parents' desire to protect her.

As nurses, we recognized Kajal's need to understand and live with her new disease. We involved her in the plan of care and gave her as many choices as were possible. We stressed the need for compliance to avoid future hospitalizations and the long-term consequences of this disease such as serious infection, blood clots, malnutrition, acute kidney failure, CHF and end-stage renal disease.

Safety & Consultations

The nurses needed to balance Kajal's need for autonomy and freedom with her need for assistance. Kajal complained of dizziness and needed monitoring and assistance when ambulating to the bathroom or on short walks in the hospital corridor.

Contributing to her “fall” risk was the furosemide (Lasix®) used to treat her edema and hypertension. Her blood pressure and other vital signs were carefully monitored. She also wore an allergy ID band for aspirin.

Consultations with infectious disease specialists for fever and the positive blood culture, and a pediatric nephrologist , were included in her treatment plan. Nutrition and social service requirements, including discharge-planning needs, were also included.

Treatment

The most important medications for Kajal included: prednisone, furosemide, Vasotec® (enalapril maleate), cefipime (Maxipime®), vancomycin (Vancocin®) and Flagyl® (metronidazole).

Prednisone is a corticosteroid given to reduce the excretion of protein in the urine. The nurse emphasized with Kajal and her mother the importance of keeping future physicians informed that Kajal was immunosuppressed as a result of this treatment and that no vaccinations could be given while taking this medicine.

Furosemide is a diuretic given to prevent reabsorption of water,

sodium and potassium by the kidney tubules resulting in the excretion of excess fluid. Oral supplements of potassium were given during this time.

Vasotec is an anti-hypertensive given to reduce high blood pressure. The nurses stressed the need for Kajal to continue taking this medication as scheduled even when she is feeling better.

Cefipime, vancomycin and Flagyl are antibiotics used to treat and prevent infection. Strict intake and output monitoring was needed, especially since vancomycin is excreted slowly in the presence of an impaired renal system. Toxicity may occur rapidly so blood pressure is monitored during administration and a sudden drop could indicate red man syndrome.

This syndrome is particularly important to watch for, as those who have a change in the immune system in the face of stress can manifest the red man syndrome with a sudden and profound drop in blood pressure, with or without the eruption of maculopapular rash over the face, neck, upper part of the chest and upper extremities.[5,6]

Goals of Nutrition Therapy

The goal for any compromised pediatric patient is to provide adequate calories and protein to promote growth and development. In Kajal's case, special attention was needed to address the presence of edema and to reduce the risks associated with disease progression. Her nutrition needs included an assessment of height (63 inches) which placed Kajal in the 50 percentile; her weight 61 kg; and the desirable body weight of 56 kg., for the 50th percentile.

Nutritional side effects to consider for Kajal include growth retardation based on protein calorie malnutrition and corticosteroid treatment. Catch-up growth of this 15-year-old was not a concern, as 16 years is the average end of skeletal growth for females.

Physiological issues to address include hypoalbuminemia due to increased rate of urinary excretion of albumin and increased catabolism of albumin pool, and hyperlipidemia (elevated VLDL and LDL), where the long-term risk for coronary artery disease is unknown in children. The diet plan emphasizes a reduction in dietary cholesterol and saturated fats to reduce lipids. The diet is required for this long-term syndrome,[7] and a sample menu is available in Table 2.

The diet modifications addressed the following.

Energy — at least the recommended dietary allowances (RDAs) for desirable body weight.

Protein — RDA for age with special attention not to replace urinary protein loss and to keep protein within .7 to 1.0 g/kg dry or ideal body weight.

Sodium — restrict when edema present and limit to 2,000 mg per day.

Fluid — restrictions based on the desired effects of diuretics.

Vitamins — insufficient amounts of calcium and B12 in the modified diet necessitate a daily calcium supplement and MVI with minerals.

Plan of Care

The plan of care needed to incorporate the key findings from the assessment, which include pain, edema and self-image.[2] Table 3 identifies the most critical elements, although we recognized the need to incorporate culture and patient education, too.

The cultural influence and age-appropriate behavior were also incorporated into the care plan. Although the pediatric nurses were experienced in taking care of patients, the need for medications and diet restrictions required a lot of time and reinforcement for patient and family education.

Patient Outcomes

During this hospitalization, the desired outcomes for Kajal were accomplished by discharge.

Pain free upon discharge: Physical and verbal expressions of pain were absent.

Exhibits minimal evidence of fluid accumulation: Edema in all locations was lessened and specific gravity brought within normal range. I&O ratio appropriate and Kajal complied with decreased fluid intake and optimal scheduling of sodium.

Progressive return to activities within disease limitations as disease subsides: Kajal and her mother were informed that the teen needs to rest when she is tired and a full return to normal activities could be expected as the treatment plan continues and the disease subsides. Kajal acknowledged the need to balance all future activities with rest and the importance of returning to school and resuming social activities within the limitations of her disease.

Absence of infection: Kajal and her mother were instructed to avoid exposure to anyone with infection as a relapse could occur. The nurse stressed the need for handwashing and told them to report any signs and symptoms of infection to the doctor immediately.

Verbalization of knowledge and demonstration of follow-up care: Both Kajal and her mother were able to verbalize signs and symptoms of disease and the importance of immediate medical attention if present. They acknowledged each medicine, its side effects, pledged to take the medicine as prescribed and understood the importance of follow-up care in the clinic and with specialists. They were able to articulate how to monitor the signs of edema by measuring weight or watching for puffiness in the extremities or around the eyes.

Table 1: Clinical Manifestations[5,6]

• Pleural effusion
• Weight gain
• Facial puffiness
• Ascites
• Labia or scrotal swelling
• Edema
• Hypoalbuminuria
• Lethargy
• Weakness
• Anorexia
• Proteinuria
• Irritability

Table 2: Sample Menu for 15-year-old Female

Breakfast: 1 chapati, Cow's milk/ skimmed milk/ orange juice , 2 cookies, sandwich.
Lunch: 2 chapatis , legumes (tur daal), 1 katori dahi, 1 fresh apple, and salad
Afternoon Snack : wafers/ seasonal fruit/ low sodium chips or papads, dry fruits
Dinner: 2 chapatis, moong dal/ rajmah/ chana/ masoor daal, 1/2 cup of steamed broccoli ,2 boiled egg, 1 glass cow's milk/ skimmed milk
Evening Snack 2 cups of popcorn/ wafers (oil-popped, no salt)
Diet analysis: 2,171 calories, 43 g protein, 350 g carbohydrates, 75 g fat. This menu is considered to be a high carbohydrate, low protein and moderate fat diet.

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