Diarrhea

Diarrhea is a very common problem especially in infants & young children. It is defined as a passage of loose bowel motion due to increased water content of the stool. It is usually associated with increased number of bowel motion. It can be defined as increased amount of stool >10g /Kg /day or >200g /day in adult.(in children , normal amount of stool= 5-9g/Kg /day).

According to the duration , diarrhea is classified into:

1.*Acute diarrhea* (duration<2 weeks).

2.*Chronic diarrhea* (duration > 2 weeks).

*Acute Diarrhea

It accounts for more than 90% of cases of diarrhea. Acute infective gastroenteritis is by far the most common cause.

*Acute infective gastroenteritis

Although accurate differentiation between bacterial ,viral ,& parasitic gastroenteritis can not be made except by stool analysis & stool culture ,the cause can be suggested in most cases by considering the character of the stool & the associated findings especially fever .

1.Bacterial gastroenteritis : It is considerable when the fever >38.5c & the diarrhea is severe or bloody .Causative organisims include : shigella , salmonella ,E.coli ,campylobacter , yersinia enterocolitica , clostridium difficile & aeromanas .Cholera should be considered in endemic areas .Accurate differentiation between these organisms can be only made by stool culture . Leuocytosis &elevated CRP level are common laboratory findings.

2.Viral gastroenteritis : Fever is usually <38.5c & the diarrhea is usually watery &not severe .The possibility is higher with preceding or associated viral respiratory tract infection ,in winter season , & when more than one member of the family are simultaneously affected .The main causes include rotavirus, enteric adenovirus, astrovirus, Norwalk agent-like virus, & calicivirus. Cytomegalovirus & herpes simplex virus have been associated with diarrhea in immunocompromised hosts.

3.Parsitic enteritis : Clinical manifestations depend on the causative agent. With Entamoeba histolytica ,diarrhea is commonly bloody & associated with tenesmus but fever is usually mild or absent. The potential complications of amebiasis include liver abscess (up to 10%), pericarditis, cerebral abscess & empyema. Treatment of amebiasis is by metronidazole (30-50 mg/kg/day for 10 days) followed by diloxanide furuate (cyst killer).With Giardia lamblia infection, the diarrhea is usually watery, foul-smelling, not severe & not associated

with fever. The possibility becomes greater when diarrhea persists for more than 10 days (giardia is the most common cause of mild persistent watery diarrhea). Accurate diagnosis is made by stool analysis which may need to be repeated. Antigen detection can be useful.

*Other causes of diarrhea

1.Dietetic diarrhea : It may follow recent change in the type of milk, concentrated formula or recent addition of new foods not suitable for the age of the infant. Detailed dietetic history is important. Food poisoning should be considered in older children with severe diarrhea especially when more than one member of the family are simultaneously affected.

2.Drug induced diarrhea : Most oral antibiotic especially ampicillin can cause acute diarrhea. Oral vitamins when given in big amount may also cause diarrhea.

3.Parenteral diarrhea : It is a diarrhea that occurs secondary to infections outside the gastrointestinal tract as respiratory & urinary tract infections. The cause of diarrhea is the increased intestinal movements (hypermotility) with the resultant decrease in transit time & water absorption. History is very important because many cases of bronchitis come with the complaints of fever, vomiting (post-tussive) & diarrhea & wrongly diagnosed as gastroenteritis.

It is important to emphasize that in all noninfectious diarrhea, the diarrhea is usually mild. Severe diarrhea is diagnostic of gastroenteritis.

*Assessment of the severity of diarrhea

The number of bowel motions can be taken as a parameter for severity. Diarrhea can be *mild* (4-6 motions/day), *moderate* (7-10 motions/day) or *severe* (>10 motions/day). For proper assessment, the volume of motions & the characters of the stool should be also considered. Stool character can be described as formed, soft, loose, very loose, watery or bloody. Big volumes of watery diarrhea is serious & can easily lead to dehydration.

*Complications

Five millions of children under the age of 5 years die every year with the complications of acute diarrhea. Most of these deaths occurs in underdeveloped countries where nutritional deficiencies & environmental pollution are quite common & facilities for proper management are less available. These complications should be considered & excluded in every case of acute diarrhea.

1.Dehydration :It is the most common & most serious complication & the main cause of death in fatal cases. It occurs mainly in infants with severe gastroenteritis due to severe

diarrhea, severe persistent vomiting or both. Infants are more susceptible to dehydration because gastroenteritis is much commoner & loss of extracellular fluid is much easier.

**Water content & water distribution in infants compared to adults*

	water content	water distribution		
		Cellular	extracellular	vascular
Infants	75%	40%	30%	5%
Adults	60%	40%	15%	5%

*Clinical Evaluation of Dehydration

Mild dehydration (3-5% weight loss): normal or increased pulse, decreased urine output, thirsty, normal physical examination.

Moderate dehydration (7-10% weight loss): tachycardia, little or no urine output, irritable/lethargic, sunken eyes & fontanel, decreased tears, dry mucous membrane, mild tenting of the skin, delayed capillary refill, cool & pale.

Severe dehydration (10-15% weight loss): rapid &weak pulse, decreased blood pressure, no urine output, very sunken eyes & fontanel, no tears, parched mucous membranes, tenting of the skin, very delayed capillary refill, cold & mottled.

(For older children & adult : Mild(3%), Moderate(6%), severe(9%))

*Types of dehydration

1.Isonatremic dehydration(75%): It occurs when water & electrolyte losses are proportionate. Clinically, the tongue is dry & the skin turgor is lost to the same extent. Serum Na level is normal (135-140 mEq/litre).

2.Hypernatremic dehydration(15%): It is characterized by marked water loss (tongue is very dry & skin turgor is near normal). Serum Na level is elevated (>150 mEq/litre).

3.Hyponatremic dehydration(10%): It is characterized by marked electrolyte losses (tongue is moist with marked loss of skin turgor). Serum Na level is low (<130 mEq/litre).

*Other complications:

2.Shock: *hypovolemic shock* (due to dehydration) &/or septic *shock* (due to gram negative septicemia) is a common complication of severe bacterial gastroenteritis. Clinically,

poor peripheral perfusion (cold extremities & skin mottling), tachycardia & hypotension are evident.

3.Acute renal failure: Clinically, severe oliguria (urine flow<1ml/ Kg/hour) or anuria & acidotic breathing are the manifestation, diagnosis is confirmed by evaluation of renal function (elevated blood urea & creatinine levels).

4.Metabolic acidosis :It occurs due to severe diarrhea (loss of alkalies) & severe dehydration (renal failure). The main clinical manifestations is the deep rapid respiration (acidotic breathing). In severe cases, altered consciousness becomes evident. Diagnosis is confirmed by blood gas analysis. The severity of acidosis can be determined by the degree of lowering pH & serum bicarbonate level.

5.Hypokalemia : It is a common complication of severe diarrhea & dehydration. Abdominal distention is the main clinical manifestation. Serum K level <3.5mEq/litre (normal level is 4-5.5mEq/litre).

6.Hypocalcemia : It may occur with severe hypernatremic dehydration. Convulsion or tetany are the main manifestations. Blood Ca level <7mg/dl(normal level is 9-11mg/dl).

7.Convulsions : The main causes are febrile convulsions, toxic convulsions (shigella or salmonella), metabolic convulsions (hypernatremia, severe hyponatremia, hypocalcemia) & intracranial hemorrhage (with DIC).

8.Bleeding : Different types of bleeding may occur especially with severe complicated cases of bacterial gastroenteritis as DIC, hypoprothrombinemia (decrease vitamin K), intussusception, & renal vein thrombhosis

9.Chronic diarrhea.

10.Malnutriton: Severe complicated gastroenteritis with dietary restriction may lead to kwashiorkor. Frequent repeated attacks may lead to growth failure & marasmus.

*Chronic diarrhea

Chronic diarrhea is a diarrhea that persists for more than 2 weeks.

■ Etiology of chronic diarrhea

- **Newborns**: congenital short gut, congenital lactose intolerance, malrotation with intermittent volvulus, ischemia, defective sodium/hydrogen exchange, congenital chloride diarrhea, microvillous disease.
- **Infants**: protein sensitization, infection, parenteral diarrhea(during urinary or upper respiratory infection), immunoglobulin deficiency, Diarrhea after gastroenteritis, cystic fibrosis, celiac disease, *Clostridium difficile* infection.
- **Toddlers**: diarrhea after gastroenteritis, food allergy, excessive ingestion of fruit juice, toddler's diarrhea, hyperthyroidism, sucrase-isomaltase deficiency, constipation/impaction with overflow, teething.

1.Chronic infections: Chronic intestinal infections are the most common cause of chronic diarrhea. Chronic giardiasis is the most common cause of persistent watery diarrhea. The three most common presenting symptoms of girdiasis are: 1.asymptomatic carrier state, 2.chronic malabsorption with steatorrhea & failure to thrive, and 3. acute gastroenteritis with diarrhea, weight loss, abdominal cramps, abdominal distention, nausea, and vomiting. Chronic amebiasis is also common. Chronic bacterial infections especially shigella, salmonella, campylobacter & yersenia enterocolitica may be also responsible. Other infections as Bilharzial colitis & Tuberculus enteritis may be responsible. Immunodeficiency whether inherited (hypogammagiobulinemia, selective Ig A deficiency) or acquired (protein calorie malnutrition & AIDS) should be considered in case of intractable severe infection.

2.Postenteritis malabsorption: It is a common persistent diarrhea Following severe gastroenteritis which causes mucosal injury & damage of intestinal villi. The main clinical manifestation is severe watery diarrhea that appears on refeeding with milk. The main 2 causes are :

a)Secondary lactase deficiency (post-infectious) : Diagnosis is confirmed by the presence of acidic stool that contains a high sugar content (stool examination for PH & reducing substances is important).

b)Milk protein allergy :as Cows milk allergy.

3. Toddler's diarrhea: It is also known as *chronic nonspecific diarrhea* and even *irritable bowel syndrome.* It is a clinical entity of unclear etiology that occurs in infants between 6 and 40 months of age, often following a distinct identifiable enteritis and treatment with an antibiotic. Loose, nonbloody stools (at least 2 per day but usually more) occur without associated symptoms of fever , pain, or growth failure. Malabsorption is not a key feature. Multiple causes may be present: overconsumption of fruit juices, relative intestinal hypermotility, increased secretion of bile acids & sodium, & intestinal prostaglandin abnormalities. The diagnosis is one of exclusion, and toddlers should be evaluated for disaccharide intolerance, protein hypersensitivity, parasitic infestation, and inflammatory bowel disease. Treatment consists of reassurance, careful growth assessment, and psyllium bulking agent (as initial therapy). Other agents used with success have been cholystyramine & metronidazole.

3.Other causes of malabsorption:

1.Celiac disease (gluten-sensitive enteropathy): It is a relatively common cause of severe diarrhea and malabsorption in infants and children. Children with celiac disease commonly present symptoms between 9 to 24 months of age with failure to thrive, diarrhea, abdominal distention, muscle wasting, anemia and hypotonia. Diarrhea usually starts with the onset of introduction of wheat or rye to the infant (bread & some cereals). The stool is bulky, greasy,

frothy, & offensive._Often these children become irritable and depressed and display poor intake and symptoms of carbohydrate malabsorption. Vomiting is less common. On examination, the growth defect and abdominal distention are commonly striking. There may be a generalized lack of subcutaneous fat, with wasting of the buttocks, shoulder girdle, and thighs. Edema, rickets, and clubbing may also be seen._Definitive diagnosis requires multiple small bowel biopsies._In a typical sequence, the first biopsy on gluten should show villous atrophy, with increased crypt mitoses and disorganization and flattening of the columnar epithelium._This should resolve fully on the second biopsy after a strict gluten-free diet. To confirm the diagnosis and eliminate the possibility of a coincidental recovery after infectious enteritis, a third biopsy must be obtained after the patient has again been challenged with gluten. This biopsy again must show the manifestations of the disease._Although biopsy remains the gold standard, two main screening antibody tests - antiendomyseal antibodies(EMA) & antitissue transglutaminase antibodies(tTG) – can shorten the expense and invasiveness of this biopsy sequence. In many patients, the titer falls dramatically with treatment and increase again with challenge.

2.Biliary atresia 3.Cystic fibrosis 4.Short bowel syndrome 5.Abetalipoproteinemia 6.Acrodermatitis enterpathica ….

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