

Location: Ambulatory Clinic.

Vitals:

Temperature 38 rectally, heart rate 155/min, blood pressure 95/55mm Hg. The patient's weight is 7.2 kg.

C.C: Vomitings and diarrhea

HPI:

The patient is a six-month old white female who is brought in by her mother for evaluation of a three-day history of vomiting and profuse diarrhea and low-grade temperatures. Mother brings her to the clinic today because the infant has become increasingly irritable and fussy when she is awake and today has become much more somnolent and does not want to feed. She has not had any wet diapers since the evening before. However, she still is having bowel movements. Mother reports that the patient has had approximately eight to ten bowel movements a day for the past two days. She has been giving the infant an increased number of breast feeds at approximately three-hour intervals; however, the child frequently vomits the milk and also has runny diarrhea. The baby has refused to take any of the rice cereal which she has been introduced to for the past month. Mother reports that the vomiting is nonbilious. It mainly consists of partially digested milk. It is not projectile and it is nonbloody. The diarrhea is watery and yellow and there does not appear to be any blood or mucus in the stool. The mother reports that the baby's temperature has been as high as 101. The mother reports that at her visit to the doctor's about three weeks ago for her immunizations she was almost 8 kg.

PMH:

The patient was delivered at 40 weeks gestation by normal spontaneous vaginal delivery. She had no birth complications and was discharged home with her mother. This patient has been meeting her developmental milestones appropriately. She is able to roll over front to back and back to front. She babbles and coos and can sit upright for brief periods with minimum support.

IMMUNIZATIONS are up to date. She just had her six-month vaccinations about two and a half weeks ago.

Social history:

She lives with her mother and father and a three-year-old sibling (brother) who attends daycare one day a week. The parents are nonsmokers. There are sick contacts in the house as the older brother had a diarrheal illness earlier last week. The family has city water. They have not traveled.

REVIEW OF SYSTEMS: is positive for irritability, decreased urine output, decreased PO intake, increased somnolence, and decreased physical activity. Review of systems is otherwise negative.

How do you approach this baby:

General
HEENT
Neck
Lungs
Heart
Abdomen
Genitourinary
Skin
Extremities
CNS

Here are the results:

In general, the patient is a well-developed, well-nourished white female lying somewhat listlessly in her mother's arms. She does not fight against the examiner during the physical examination. HEENT: Anterior fontanel is open and depressed. Posterior fontanel is closed. Mucous membranes are dry. Eyes are slightly sunken with dark circles underneath them.

Tympanic membranes are pale with good light reflex bilaterally. Neck is supple. There is no evidence of meningeal irritation to neck flexion or extension. There is no cervical lymphadenopathy. Pupils are equal, round and reactive to light. Oropharynx is clear. Cardiovascular: Heart rate is regular rhythm but somewhat tachycardic. There is a II/VI systolic ejection murmur along the left sternal border. Lungs are clear to auscultation bilaterally. Abdomen is soft, nondistended and nontender. There are hyperactive bowel sounds in all four quadrants. Extremities: Pulses are +2 in all four extremities. Capillary refill is about 3-4 seconds. GU: Normal female genitalia, mild diaper dermatitis present. Neurologic: The patient is somewhat listless and irritable but after a time is able to be consoled. Skin shows decreased turgor. There are no rashes.

DIFFERENTIAL DIAGNOSIS for this child with acute diarrhea as well as vomiting: At the top of the list is an infectious gastroenteritis with the two main groups being viral gastroenteritis--with etiologies including rotavirus, enterovirus, adenovirus and Norwalk agent--and the bacterial enterocolitis agents including Shigella, Salmonella, Yersinia, Campylobacter, enteroinvasive E. coli, enteropathogenic E. coli, and C. difficile colitis. Other possible etiologies of acute diarrhea include extraintestinal infections such as otitis media and urinary tract infections, and GI causes including intussusception, appendicitis, and hyperconcentrated infant formula. Other causes include antibiotic-induced diarrhea, vasculitides such as Henoch-Schonlein purpura, renal diseases including hemolytic uremic syndrome and toxic ingestions including iron, mercury, lead and fluoride ingestion.

This patient's clinical presentation includes (1) a sick contact with a three-year-old sibling who had self-limited gastroenteritis symptoms the prior week, (2) low-grade temperature, (3) the lack of any preceding use of antibiotics, and (4) nonbloody stools. The most common cause for this picture is acute viral gastroenteritis.

How do you proceed:

LABORATORY STUDIES: Depending on how dehydrated the patient appears clinically, one might forego any laboratory studies and just treat her symptomatically with either oral electrolyte replacement solutions or IV rehydration in the clinic setting. However, based on her change in weight, it appears that she has lost about 7-10% of her body weight and is showing clinical signs that she is significantly dehydrated. Therefore, appropriate labs to obtain would be a basic metabolic panel and a CBC with differential. Stool should be heme checked and if it is positive, then stool samples could be sent for culture. If there had been a past history of antibiotic use, then a C. difficile antigen could be sent to rule out C difficile colitis. If the patient is being seen during the winter months, then stool can be sent for rotavirus assay since rotavirus can cause up to 65% of infant diarrhea during winter months. Stool can also be sent for fecal leukocytes, which also help to indicate that it is an infectious or inflammatory process. Because this child is moderately dehydrated, a urinalysis should also be sent to look for urinary tract infection.

ORDERS: Labs as above. The patient should be given a fluid bolus with normal saline 20cc/kg IV until the labs come back. A repeat fluid bolus can be given as well. The patient should be allowed to feed as tolerated. In this case, the patient is breast-fed so orders for breast-feeding ad lib (frequent small feedings) would be appropriate. It can be helpful if the mother can feed the infant in smaller more frequent feedings whether breast-fed or bottle-fed. In addition, bottle fed infants can also be given an oral electrolyte solution; again small frequent feedings are preferable to decrease stomach irritation and reflex vomiting.

Review orders:

- IV access
- CBC with diff, stat
- BMP, stat
- Urine analysis
- IV NS, bolus
- IV NS, continuous
- Stool heme check
- Stool for leukocytes
- Stool culture
- Breast-feeding ad lib

Here are the results:

Laboratory studies return. CBC shows a white blood count of 11, hemoglobin 14, hematocrit 42.1, platelets 370, differential shows segmented cells 52%, lymphocytes 20%, monocytes 5%, eosinophils 10%. Basic metabolic panel shows a sodium of 131, chloride 106, potassium 3.2, CO₂ 18, BUN 22, creatinine 0.6, calcium 9.8, glucose 87. A catheterized urine specimen yielded a scant amount of dark amber clear fluid. Specific gravity 1.032, negative for esterase, negative nitrates, no blood, 1-5 white blood cells, 0 red blood cells, no casts. Culture eventually is negative.

DISPOSITION: This patient should be admitted to the hospital for IV fluid rehydration because she is greater than 5% dehydrated, not taking enough oral fluids to meet her maintenance needs, and showing a declining mental status with irritability and listlessness.

Review orders:

Admit in ward/floor

IV Potassium

Vitals Q 4 hours

Recheck the BMP next day

Repeat physical exam for every 4-6 hours

Once the patient is adequately hydrated and the BMP is normal, discharge the patient to home.

DISCUSSION: Acute gastroenteritis is a very common pediatric problem and because many of the etiologies are self-limited, the clinician should direct attention to the patient's overall fluid and electrolyte status as top priorities in management. Attention should be paid to the patient's vital signs looking for tachycardia and evidence of weight loss. The physical exam should focus on hydration status by looking at mucous membranes, sunken eyes, skin turgor and capillary refill, which in normal children is less than two seconds. Abdominal exam should focus on whether there is any distention, tenderness or masses; frequently bowel sounds are hyperactive in viral or bacterial gastroenteritis. Direct inspection of the stool can be helpful as bloody or mucous stool is more often associated with bacterial pathogens and would direct investigations towards those etiologies. One would send a stool culture for *Shigella*, *Campylobacter*, *Salmonella* and *Yersinia* as well as the enteroinvasive *E. coli*. Pathogens that will require more than just supportive treatment with fluids and electrolytes include *Campylobacter jejuni* infection, which is treated with erythromycin; *C. difficile* colitis, which is treated with metronidazole; and systemic salmonellosis, which is treated with fluoroquinolones or azithromycin or third generation cephalosporins such as ceftriaxone or cefotaxime. Bactrim may also be started empirically, but there is increasing resistance of *Salmonella* to Bactrim. In those children whose diarrhea is due to *Giardia*, a variety of drugs are used: metronidazole, furazolidone, or quinacrine, for example.

History taking should include questions about travel, well water (since *Giardia* can contaminate well water), immunization status, sick contacts, and daycare attendance (since *Campylobacter* outbreaks have been found in daycare centers). One should also ask about the duration of symptoms, fever, and the number, character, and color of the stools, particularly whether there is any blood or mucus in the stools.

Primary diagnosis

Acute gastroenteritis