

Gastroesophageal Reflux Disorder: Difficulties in Diagnosis and Treatment in Infants

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Abstract

Gastroesophageal Reflux Disease (GERD), as the name suggests, is a condition wherein there is a reflux of the contents of the stomach towards the oesophagus, which eventually leads to pathological changes in the oesophagus itself if not managed at an early stage appropriately. Here we present a case of a 6 month old infant who presented with a history of repeated cough, fever, difficulty in breathing and poor weight gain. Various physicians saw the infant, however, due to worsening symptoms and no relief, the infant presented to the paediatric emergency department of the Abbasi Shaheed Hospital. An initial management for pneumonia was done but there was a persistence of symptoms even after clearance of the pneumonic patch. An upper gastrointestinal (GI) imaging study, including Barium swallow and fluoroscopy was done to evaluate the anatomy of the upper gastrointestinal tract which showed mild to moderate reflux but no strictures, stenosis, achalasia or gastric outlet obstruction. The infant was managed via medical intervention and lifestyle counselling. On follow-up, the infant improved clinically and gained weight. It is extremely important in such cases to have a strong clinical suspicion of Gastroesophageal reflux (GER) which may lead to GERD, while assessing the patient's signs and symptoms and to support the diagnosis of GERD with appropriate investigations and management.

Keywords: Gastroesophageal Reflux Disease, infants, diagnosis, lower esophageal sphincter.

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Introduction

Gastroesophageal reflux disease (GERD) is the retrograde movement of gastric contents into the oesophagus resulting in symptoms or complications. It represents one of the most common gastroenterological disorders that lead to referral to a paediatric gastroenterologist during infancy. GERD is one of the most common ailments afflict-

ing the human population with a prevalence that ranges in between 10% to 20% in the Western countries, whereas less than 5% in the Asian population¹. Its prevalence in infants and children is up to 8% (depending on symptoms and severity)². Gastroesophageal Reflux (GER) is most commonly seen in infancy, with a peak at the age of 1-4 months. However, it becomes pathological when it causes troublesome symptoms and physical complications, hence the term gastroesophageal reflux disease (GERD). The causes and risk factors for GER in children are frequently multifactorial. Upto 90% of GER episodes in infants and children occur during transient lower esophageal sphincter relaxation (TLESR) which is a primary mechanism allowing reflux to occur.

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The symptoms of GER are most often directly related to the consequences of emesis (e.g. poor weight gain) or result from exposure of the gastroesophageal epithelium to the gastric contents³. Paediatric patients with GERD typically cry and show sleep disturbances and decreased appetite. Most cases of paediatric GER are diagnosed based on the clinical presentation. Conservative measures can be started empirically. However, if the presentation is atypical or if the therapeutic response is minimal, further evaluation via imaging is warranted.

For diagnosis of GERD radiological investigations include barium swallow and fluoroscopy of the upper gastrointestinal (GI) is useful to rule out anatomical abnormalities, but are not sensitive to make the diagnosis of reflux. Intraoesophageal pH probe monitoring is standard for quantifying gastroesophageal reflux. It differentiates erosive oesophagitis from eosinophilic oesophagitis. Multichannel intraluminal impedance with pH (MII-pH) correlates symptoms with acid and non-acid reflux episodes. Oesophageal manometry is useful to confirm achalasia or rumination, which mimics GERD. While endoscopy and biopsy visualise mucosa breaks in distal oesophagus, a reliable evidence of reflux oesophagitis⁴.

The goal of medical therapy in GERD is to decrease acid secretion and, in many cases, to reduce gastric emptying time which includes non-pharmacotherapy, pharmacotherapy and surgical options.

We report this case here to elaborate the presentation, evaluation and management of GERD supported by relevant literature search and possible aetiology with a differential diagnosis.

Case Report

A 6 month old male child weighing 4.2 kg, presented to the ER of Pediatric Unit II, Paediatric Intensive Care Unit-II (PICU) of Abbasi Shaheed Hospital on 2nd July 2016, complaining of cough with subsequent fever along with difficulty in breathing. According to the mother, the child had devel-

oped cough 7 days back; the cough being non-productive, mild to moderate in intensity and typically became worse after feeding, resulting in the child vomiting. Three days later, the child also developed a fever which was intermittent, reaching a peak of 101-102°F with no rigors or chills and was temporarily relieved by over-the-counter anti-pyretic and sponging. The baby was seen by various physicians; however, the morning before hospitalization at Abbasi Shaheed Hospital, the child had developed difficulty in breathing and was unable to feed. This sudden deterioration of health compelled the parents to take the child to the hospital.

The child had a significant past history of recurrent chest infections from the age of 2 months. He was also admitted 2 months back due to similar complaints. Birth history was uneventful with the mother being a booked case at a private hospital, delivered at full term via spontaneous vaginal delivery. He was fed exclusively on mother's feed. Vaccination was up to date and the BCG scar was present. The patient had reached normal developmental milestones. He is the second product of a consanguineous marriage with no history of tuberculosis, asthma or cardiac disease in the family. Belonging to a middle-class family, the child's father was a retailer, solely earning for a family of four. The house had three spacious rooms with satisfactory hygienic conditions and the family used boiled water.

On examination, the child was conscious and tachypneic, with a respiratory rate of 72 breaths per minute, a heart rate of 168 beats per minute and was febrile. He presented with pallor but no other abnormal sub-vitals. Lymph nodes were not palpable. Anthropometric measurements showed that the child had a weight of 4.2 kg (less than 5th percentile according to WHO), a length of 54 cm (95th percentile) and a head circumference of 44 cm (90th percentile). Chest was moving symmetrically with respiration and intercostal and subcostal recession was observed along with nasal flaring. Auscultation revealed bilateral crepts. Normal heart sounds were present without any murmur. Central

nervous system (CNS) was intact. Abdomen was soft, non-tender and no visceromegaly was felt and the gut sounds were audible.

A differential diagnosis was made which included pneumonia, bronchiolitis, congenital heart diseases, GERD. Lab investigations for initial evaluation were carried out according to the guidelines provided⁴ which revealed a Total Leukocyte Count of $19.0 \times 10^9/L$, Haemoglobin 8.0 g/dL, and Haematocrit of 29.2%. Urea, creatinine and electrolytes (UCE) test showed that his urea level was at 26 mmol/L, Creatinine at 0.7 mg/dL, Sodium at 136 mmol/L, Potassium at 4.3 mmol/L, and Bicarbonate at 27 mmol/L. Echocardiography was performed to rule out congenital heart disease, which showed a normal left ventricle with normal systolic function and no abnormality in the valves. Blood culture and sensitivity report showed that no organism was present. A Barium Swallow Test with fluoroscopy was performed on the patient which established that mild to moderate gastroesophageal reflux was present in our patient with no evidence of hiatus hernia, strictures or ulcers (Fig. 1,2,3). Esophagus appeared normal on fluoroscopy. Chest X-Ray showed bilateral patchy infiltrates (Fig. 4).

A final diagnosis of severe pneumonia associated with mild to moderate GERD was established and immediate treatment was started accordingly. Patient was NPO till further orders, airway was maintained by nasal bubble continuous positive pressure ventilation (CPAP), an intravenous (IV) line was maintained and nebulization was done. Patient was given injection Ceftriaxone 70 mg/kg/day, syrup Famotidine 0.5 mg/kg/dose 12 hourly, and syrup Domperidone 0.25 mg/kg/dose 8 hourly. The child was admitted in the Paediatric ICU for 20 days and was discharged on 22nd July 2016 upon improvement of health and resolution of symptoms. Mother was counselled regarding the lifestyle changes which included: upright positioning after feeding, head end elevated about 30 degrees, left lateral position while sleeping and when the child was awake he was kept in prone position and carried in an upright position. He was given small feeds with in-

creased frequency of thickened cereals. Also, increased proportions of solids or semi solids were given. Acid containing foods and lying in supine position were avoided, after taking meal. The patient was on regular follow-up in the outpatient department (OPD) with significant improvement in weight (an increase from 4.2 kg to 5.8 kg), no episodes of vomiting and no chest complaints upto 3 months.

Patient was readmitted in Paediatric ICU of Abbasi Shaheed Hospital in November, 2016 with the symptoms of respiratory distress and vomiting. He was treated aggressively due to his critical condition. Oxygen inhalation was provided at 5 litres/minute with the head end raised. The child was nebulised with Ventolin and Ipratropium Bromide and an IV line was maintained through which Ceftriaxone was given to the patient. Investigations including random blood sugar, complete blood picture, UCE and blood culture was done. Chest X-Ray was done showing patchy bilateral infiltrates. Upon improvement of health the patient was discharged and continued on syrup Famotidine 0.5mg/kg/dose and syrup Domperidone 0.25mg/kg/dose. OPD follow-ups show that he continues being healthy to date.

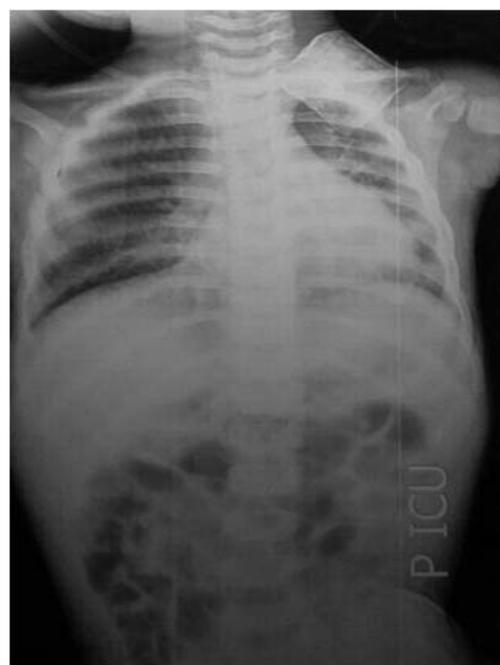


Fig 4. Chest X-Ray showing bronchopneumonia.

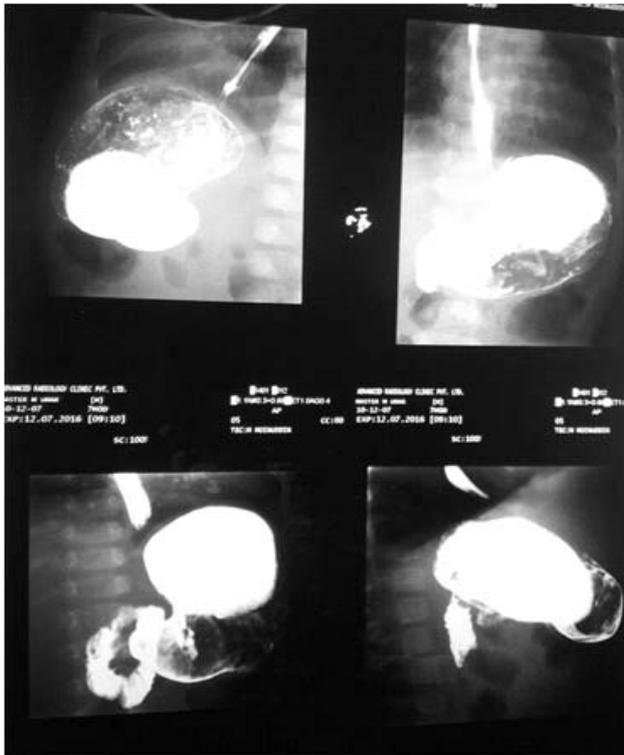


Figure 1.



Figure 3.



Figure 2.

Fig 1,2,3. Patient's Barium Swallow Test revealing no hiatal hernia, ulcers or strictures.

Discussion

A 6 months old infant was presented with a history of repeated cough, fever, difficulty in breathing and poor weight gain. After initial management for pneumonia an upper gastrointestinal (GI) imaging study, including Barium swallow and fluoroscopy was done which showed mild to moderate reflux but no strictures, stenosis, achalasia or gastric outlet obstruction. The infant was managed via medical intervention and lifestyle counselling. On follow-up the infant was clinically improved and gained weight.

Regurgitation is extremely common in infants, with almost 70-85% infants having regurgitation problems in the first 2 months of life which self-resolves in 95% of the cases by the time they are 1 year old⁵. In our patient the reflux symptoms persisted and did not disappear with increasing age and required repeated admissions in the hospital. The key cause of GERD is being the transient relaxation of the Lower Esophageal Sphincter (LES) which causes the intragastric pressure to become higher than the LES pressure leading to regurgitation. Continuous exposure of the oesophageal epithelium to acidic content of the stomach leads to columnar metaplasia of the squamous epithelium, which is the basic pathology of this disease. Histologically, due to metaplasia, cardiac mucosa can be seen at the lower part of the oesophagus and can either develop parietal cells turning it into oxyntocardiac mucosa or goblet cells forming intestinal mucosa (also known as Barrett's oesophagus). Intestinal metaplasia makes the epithelium vulnerable to carcinogens in the refluxate making it a premalignant condition^{6,7}.

Following are the most common signs and symptoms of GER in infants and young children. Typical or atypical crying and/or irritability, apnea, bradycardia, poor appetite, apparent life threatening event (ALTE), vomiting, wheezing, abdominal and/or chest pain, stridor, weight loss, recurrent pneumonitis, sore throat, chronic cough, water brash, Sandifer syndrome i.e posturing with opisthotonus or torticollis⁴. In the present case, the child had irritability, vomiting, poor appetite, respiratory distress, wheezing, cough and recurrent pneumonitis.

The causes and risk factors for gastroesophageal reflux in children are frequently multifactorial.

Anatomic factors that predispose to gastroesophageal reflux include the following: the angle of His (made by the oesophagus and the axis of the stomach), the presence of a hiatal hernia may displace the lower esophageal sphincter (LES) into the thoracic cavity, resistance to gastric outflow raises intragastric pressure and leads to reflux and vomiting. Other factors that predispose individuals to gastroesophageal reflux include the following medications: diazepam, theophylline, methylxanthines. Also, poor dietary habits including overeating, eating late at night, assuming a supine position shortly after eating, food allergies and certain foods e.g. greasy, highly acidic foods. Motility disorders (postulated to potentially cause reflux) include antral dysmotility and delayed gastric emptying. While neurodevelopmental disabilities in children include cerebral palsy and Down syndrome^{2,3,4} none of which were present in our patient.

Vomiting is a symptom associated with many disorders. Conditions to consider in the differential diagnosis of gastroesophageal reflux include the following: acute gastritis, chronic gastritis, eosinophilic oesophagitis, oesophageal motility disorders, food allergies, helicobacter Pylori infection, hiatal hernia, intestinal malrotation, paediatric duodenal atresia and stenosis surgery and peptic ulcer disease. These conditions were excluded in our patient based on the history, investigations, response to the medication and lifestyle given to the baby by the parents.

Diagnosis of GERD in infants^{1,2} is complicated by the fact that they cannot narrate their symptoms. The diagnosis can be made from the history and physical examination. Upper gastrointestinal GI imaging studies such as Barium swallow and fluoroscopy is used to evaluate the anatomy of upper gastrointestinal tract but it has poor sensitivity and specificity in the diagnosis of GERD due to its inability to differentiate between GER and GERD. In our case barium swallow and fluoroscopy was done showing mild to moderate reflux but no strictures, stenosis, achalasia or gastric outlet obstruction was seen. Other methods used are intraesophageal pH probe monitoring and upper endoscopy⁸. Twenty four hours pH monitoring has become a widely over-used modality and it remains the standard criterion for quantifying gastroesophageal reflux. Unfortu-

nately, this test could not be performed in our case due to unavailability of this procedure for infants in Karachi. Upper GIT endoscopy is an important diagnostic tool but it is usually performed in severe cases of GERD and not recommended in our case. Other tests include multichannel intraluminal impedance with pH (MII-pH) which correlates symptoms with acid and non-acid reflux episodes. Oesophageal manometry is useful to confirm achalasia or rumination which mimics GERD.

The schematic therapeutic approach consists of 6 phases of management of GERD in an infant or child^{9,10}. Phase 1 includes observation, lifestyle changes and parental education. Parents should be taught about the use of pacifiers and overfeeding should be discouraged. Phase 2 is treatment through dietary modification. This is focused on decreasing the regurgitation in the infant. Methods used are reduction in food volume, thickened formula feed and avoiding cow-milk proteins. Positional treatment is also included here, wherein the infant is kept at a 30° elevated prone position. Phase 3 is for immediate symptom relief which includes giving alginates and antacids. Phase 4 is for mild to moderate GERD where we give Proton Pump Inhibitors, which is actually a drug of choice for GERD¹⁰. This was chosen as a therapeutic approach in our case along with management for bronchopneumonia. But not all patients respond to this therapy which leaves surgical intervention⁸ as the only option. Phase 5 consists of the use of prokinetics (but its efficacy has not been proved yet). The final treatment option is Phase 6, laparoscopic surgery, which is rarely opted. Physicians should determine the phase that their patients fall into according to their symptoms and lab investigations and follow the specified course for each phase.

The limitation of this case report is that oesophageal manometry was not done; however, it is not available in the majority of the leading university hospitals of the country.

Conclusion

GERD presents symptoms which are extremely troublesome for infants, effecting their nourishment severely. It can be tricky to diagnose but

can be easily managed if clinicians are observant and early identification of disease is accomplished.

Conflict of Interest

Authors have no conflict of interests and no grant/ funding from any organization for this study. Permission was taken from patients for publication of this case report.

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