

Gastro esophageal reflux: An over investigated entity in neonates and infants

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Abstract

Objectives: To determine the outcome of clinically suspected gastro esophageal reflux in neonates and infants. To find a protocol for evaluation of these patients in order to reduce unnecessary radiation to neonates and infants.

Methods: Fifty three neonates and infants of up to 1 year of age with clinical suspicion of gastro esophageal reflux (GER) were referred for Upper gastro intestinal barium studies. This retrospective descriptive case study was carried out over a period of one year starting from October, 2006 to September, 2007. Positive cases were followed for another one year to see the final outcome. The neonate and infants of upto one year of age, referred from Neonatal intensive care unit (NICU), Paediatric ward and Out Patient Department (OPD) were included in this study.

Results: Out of 53 cases 32 were positive for G.E.R and no reflux could be identified in rest of the patients. Out of these positive cases only 4 had massive or severe G.E.R. These patients were prescribed conservative and medical treatment and were advised to follow up in the O.P.D where on subsequent follow ups the medical treatment was stopped as there were no further complaints. These patients showed normal weight gain on subsequent O.P.D visits. Other positive cases only had mild to moderate G.E.R and they were managed conservatively. These patients showed normal weight gain on subsequent O.P.D visits with complete resolution of symptoms.

Conclusion: Regurgitation or gastro esophageal reflux is a common finding in the first 3 months of life (especially in preterm infants) and usually resolves by 6-12 months of age and should not be over investigated (JPMA 60:984; 2010).

Introduction

Gastro esophageal reflux in neonates and infants is a well known clinical problem in both term and pre term infants,¹ especially for the first 3 months of life and usually resolves by 6-12 months of age. Although virtually all infants have some degree of GER, the severity of symptoms ranges widely from an occasional burp to persistent emesis. The symptoms resulting from GER disease in neonates are not very clear with regards to cause and association.² Most cases resolve spontaneously or with simple medical measures.¹ Serious complications such as esophagitis, stricture, and aspiration do occur but are uncommon under one year of age. Initial imaging often is directed towards the demonstration of reflux and its complications subjecting these infants to excessive and sometimes unnecessary radiation. Hence, we conducted this retrospective descriptive case study to determine the outcome in terms of resolution of the symptoms in these patients and tried to establish an institutional protocol for the investigation of these patients which might help others in this regard. Its emphasis is on proper patient selection and clinical history.

Patients and Methods

Between October, 2006 to September, 2007 a total of

53 neonates and infants with clinical suspicion of GER were referred to our Medical Imaging department for upper gastrointestinal contrast studies. There were 27 preterm and 26 full term babies. These patients included OPD referrals as well as inpatients from NICU and paediatric ward. Approval from ethical committee was not required because the study was an audit of an established and accepted study.

The inclusion criteria were neonates and infants up to 1 year of age born to mothers who had no complication of pregnancy such as diabetes, hypertensive disease of pregnancy or IUGR, at a gestational age of 28-42 weeks, and not asphyxiated at birth. The exclusion criteria were incomplete follow up, presence of other co-morbidities like necrotizing enterocolitis, congenital heart disease or meconium aspiration syndrome. Out of 53 patients, 32 were males and 21 were females. Twenty seven patients were preterm. Forty four patients had mild to moderate symptoms including spitting up, vomiting, coughing, irritability and poor feeding. Nine patients had severe symptoms like persistent and frequent vomiting, increasing tracheal secretions, recurrent episodes of pneumonia, stridor and poor weight gain. All infants with severe symptoms were preterm.

Upper GI contrast studies were carried out in all 53

patients to demonstrate the reflux and its possible complications as well as to determine anatomical abnormality as a cause of reflux. The GER was classified by Roy McCauley and workers into following grades:³

Grade 1: reflux into distal esophagus only.

Grade 2: reflux extending above carina but not into cervical esophagus.

Grade 3: reflux into cervical esophagus.

Grade 4: free persistent reflux into cervical esophagus with a widely patent cardia (chalasia).

Grade 5: reflux with aspiration into the trachea or lungs.

For simplicity we categorized reflux into mild reflux (grades 1 and 2), moderate (Grade 3), and major reflux (grades 4-5). The patients with radiologically proven GER were followed in OPD for up to 1 year to see the final outcome.

Results

Upper GI studies performed in 53 neonates and infants revealed presence of GER in 32 patients while no reflux could be demonstrated in the rest. None of these patients had any associated co-morbid or perinatal complications. Out of these 32 patients, 19 were preterm and 13 were full term babies. Nineteen patients (13 full term and 6 preterm) had mild reflux and all of them had mild clinical symptoms. Nine preterm babies had moderate GER, out of which 2 had mild symptoms and 5 had severe symptoms. Severe GER was found in 4 preterm infants who had severe clinical symptoms. Out of 44 patients with mild clinical symptoms, 21 had no radiological evidence of GER, 19 had mild GER and 4 had moderate reflux. Nine patients had severe clinical symptoms, out of which 5 patients had moderate reflux and in 4 of them severe reflux was demonstrated. No anatomical abnormality was found in any patient as a potential cause of reflux.

The patients with radiological evidence of GER were initially managed conservatively. The conservative measures included attention to positioning (babies to be kept upright for 30 minutes after feeding), thickened feedings (add 1 tablespoon of rice cereal to 2 ounces of infant formula milk or expressed milk for breast feeding infants) and small quantities with more frequent feedings. They were advised for close follow up in OPD with 100% patient's compliance. On subsequent follow ups conservative treatment was stopped in 29 patients, as there were no further complaints in them and these patients were put on normal breast feeding and formula milk. Out of these 29 patients, 28 had mild to moderate reflux and 1 patient had severe reflux. Three infants had persistence of symptoms on initial follow ups, so they were then given

medical treatment in addition to conservative measures. The medical treatment included Ranitidine (Zantac), an H₂-receptor agonist (1-2 mg/kg/dose, thrice a day). All these three patients had significant symptoms and severe reflux. Babies' weights were not measured before the start of study however; these 3 babies who did not respond to the conservative measures were subjected to weight measurements during the medical treatment. On further follow ups these patients showed normal weight gain with complete resolution of symptoms. No surgical intervention was considered in any of these patients due to desired outcome.

Discussion

Gastro esophageal reflux in neonates and infants has been recognized clinically and radiologically for many years. The condition is becoming increasingly accepted as a significant cause of such symptoms as vomiting, feeding intolerance, failure to thrive, respiratory disease and dysphagia. Many case reports of upper respiratory tract disorders are being associated with GER in children.^{4,5} Reflux of gastric contents is a physiologic occurrence that takes place more often during infancy and decreases with advancing age.⁶ Regurgitation has been reported in 40-65% of healthy infants but decreases to 1% by one year of age.¹ The incidence of G.E.R is slightly more in preterm infants. Harbovsky and Mullet⁷ reported the incidence of G.E.R in their preterm population as 2.8% (22 cases out of 760 admissions). It usually has no definitive pathologic cause and is unrelated to a functional defect. The lower esophageal sphincter at the distal end of esophagus has attracted the greatest amount of interest in attempts to explain why newborns and infants seem to have a greater tendency to G.E.R than do older children or adults.

The possible explanations for reflux include a decreased basal tone in neonates and infants. Recent evidence from animal models suggests that newborn gastric muscles may function differently than adult gastric musculature.⁸ These differences may give rise to more retrograde peristalsis in newborns and hence leads to G.E.R.

There are 3 modes of imaging available for the evaluation of reflux: upper GI contrast series, US of upper GI tract and gastro esophageal scintigraphy. Each has its advantages and disadvantages, but the most sensitive test for demonstration of reflux is the gastro esophageal scintigraphy.⁹⁻¹¹ The scintigram has the added advantage that it may well detect aspiration of gastric contents into the lungs;¹²⁻¹⁴ however, the efficacy of this aspect of the study has been questioned by other workers.¹⁵ The barium upper GI series is still commonly utilized for demonstration of reflux; however its main role is to look for the complications of GER and any possible anatomic

obstruction in the intestinal tract. The other studies available for detecting GER include monitoring the pH of esophageal fluid, manometry, and esophagoscopy.

Our study showed that GER especially of higher grades was more common in preterm babies which correlate with the literature. The data also confirmed the fact that in majority of cases it resolves spontaneously^{1,2,4} suggesting that GER may be a maturational phenomenon, because infants outgrow this over time. Therefore, clinical history is very important in selecting patients. The neonates and infants with severe clinical symptoms of GER require radiological investigation and the infants who have only mild symptoms may need observation and conservative measures only. This protocol is helpful to avoid the unnecessary imaging in these infants. One limitation of our study is that we did not follow or further investigate those infants who had no radiological evidence of GER on upper GI contrast series.

Conclusion

The majority of the infants with symptoms of GER require no diagnostic or therapeutic maneuvers other than a careful history, physical examination and reassurance to the parents. Infants with persistent symptoms and detrimental physical changes need appropriate imaging studies to demonstrate reflux and its complications, and to rule out specific anatomic abnormalities.

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References

1. Swischuk LE, Hayden CK Jr, Fawcett HD, Isenberg JN. Gastro esophageal reflux: how much imaging is required? *Radiographics* 1988; 8: 1137-45.
2. Jadcherla SR. Gastro esophageal reflux in neonates. *Clinics Perinatol* 2002; 29: 135-58.
3. McCauley RGK, Darling DB, Leonidas JC, Schwartz AM. Gastro esophageal Reflux in Infants and Children: A Useful Classification and Reliable Physiologic Technique for its Demonstration. *Am J Roentgenol* 1978; 130: 47-50.
4. Burton DM, Pransky SM, Katz RM, Kearns DB, Seid AB. Pediatric airway manifestations of gastro esophageal reflux. *Ann Otol Rhinol Laryngol* 1992; 101: 742-9.
5. Canon CL, Morgan DE, Einstein DM, Herts BR, Hawan MT, Johnson LF. Surgical approach to Gastro esophageal Reflux Disease: What the Radiologist Needs to Know. *Radiographics* 2005; 25: 1485-99.
6. Mohan N, Soni A. Gastro esophageal reflux in neonates. *J Neonatol* 2002; 16: 257-66.
7. Harbovsky EE, Mullet. Gastro esophageal reflux and the premature infant. *J Pediatric Surg* 1986; 21: 583-7.
8. Hblloway RH, Berger K, McCallum RW. Gastric distension: A mechanism for postprandial gastro esophageal reflux. *Gastroenterology* 1985; 89: 779-84.
9. Arasu TS, Wyllie R, Fitzgerald J, Franken E, Siddiqui A, Lehman G et al. Gastro esophageal reflux in infants and children: Comparative accuracy of diagnostic methods. *J Pediatr* 1980; 96: 798-803.
10. Blumhagen JD, Rudd TG, Christie DL. Gastro esophageal reflux in children: Radionuclide gastroesophagography. *Am J Roentgenol* 1980; 135: 1001-4.
11. Heyman S. Esophageal scintigraphy (milk scans) in infants and children with gastro esophageal reflux. *Radiology* 1982; 144: 891-4.
12. Boonyaprapa S, Alderson PO, Garfinkel DJ, Chipps BE, Wagner HJ Jr. Detection of pulmonary aspiration in infants and children with respiratory diseases: Concise communication. *J Nuclear Med* 1980; 21: 314-8.
13. McVeagh P, Howman-Giles R, Kemp A. Pulmonary aspiration studied by radionuclide milk scanning and barium swallow roentgenography. *Am J Dis Child* 1987; 141: 917-21.
14. Reich SB, Early WC, Ravin TH, Goodman M, Spector S, Stein MR. Evaluation of gastropulmonary aspiration by a radioactive technique: Concise communication. *J Nucl Med* 1977; 18: 1079-81.
15. Fawcett HD, Hayden CK Jr, Adams JC, Swichuk LE. Clinical efficacy of gastro esophageal reflux scintigraphy in childhood aspiration. *Pediatr Radiol* 1988; 18: 311-3.