

ORAL MANIFESTATIONS OF GASTROESOPHAGEAL REFLUX DISEASE IN CHILDREN

Ancuta Ignat¹, Marin Burlea², Vasile Valeriu Lupu^{3*}, Gabriela Paduraru⁴

^{1,2,3,4} Pediatrics Department, "Gr. T. Popa" U.M.Ph. - Iași, Romania

*Corresponding author; dr. Vasile Valeriu Lupu, 16 University st., Iasi, 700115, Romania
valeriolupu@yahoo.com tel. +40.740013955

ABSTRACT

Gastroesophageal reflux (GER) is a condition characterized by the retrograde passage of the gastric contents into the esophagus and subsequently into the oral cavity. Dentists can frequently diagnose a systemic disease by analysing the oral cavity – especially GERD with a minimal expression of digestive symptoms. Typical oral manifestations in GERD are dental erosions, burning sensation, mucosal erythema of the palate and uvula, and bruxism. Late diagnosis and, implicitly, late treatment of GERD can lead to significant deterioration of the teeth and mastication system. The successful treatment of GERD requires a multidisciplinary approach involving gastroenterologists, ENT specialists and dentists.

Key words: gastroesophageal reflux disease, dental erosions, oral lesions, bruxism, children

INTRODUCTION

Gastroesophageal reflux (GER) is a condition frequently encountered during childhood, characterized by the retrograde passage of the gastric contents into the esophagus and subsequently into the mouth (1, 2). GER may be physiological (it disappears around the age of 12-18 months) or pathologic. Digestive symptoms (regurgitation, vomiting, merycism) or non-digestive (respiratory, neurobehavioral and/or nutritional consequences) may occur. Respiratory symptoms include: chronic cough, obstructive apnea episodes, wheezing, chronic or recurrent pneumonia, chronic dysphonia, cyanosis episodes, aspiration pneumonia, bronchial asthma, and recurrent otitis media. Neurobehavioral symptoms include sleep disturbances, agitation and crying episodes, neck hyperextension, arching and rigidity or irritability. Also, nutritional consequences such as growth impairment or hypochromic microcytic anemia may occur. Classic symptoms of GER may be absent in some patients. Dentists can frequently diagnose a systemic disease by analyzing the oral cavity, especially the gastroesophageal reflux disease (GERD) with a minimal expression of digestive symptoms. The

presence of acid reflux in the oral cavity can cause dental erosion, especially at the palatine surface level (3). Dental erosion is defined as the progressive loss of tough dental tissues caused by a chemical (4). This has been associated with the ingestion of acidic foods, bulimia, rumination and GERD (5, 6,7, 8). The authors of a study performed on 112 children reported a significant incidence of dental erosions in patients with GERD compared to the control group, both in primary teeth and in permanent teeth (9). Typical oral symptoms in GERD are dental caries, dry mouth, burning sensation, halitosis, mucosal erythema of the palate and uvula.

THE PROTECTIVE ROLE OF SALIVA

Saliva plays an important role in the protection of the oral cavity against mechanical, thermal, microbial and chemical damage (endogenous and exogenous acids) (10). It provides all the raw ingredients necessary to repair the tough dental tissue by remineralization and has a buffering action both in the resting phase and in the stimulation phase (11). Saliva allows for effective mastication, swallowing and speech. Saliva also has antibacterial and antifungal properties that control the nature of oral

biofilm, and thus has a protective role. Acid acts most often on the structure of the tooth in situations where saliva is compromised from a qualitative and quantitative point of view. However, even in situations where saliva is not compromised, low pH acidic media cause a rapid demineralization of the tooth surfaces.

The authors of several studies have found a significant association between GERD, hyposalivation and "dry mouth" (xerostomia), which is commonly associated with the oral burning sensation (12).

The main method for preventing the endogenous erosion of teeth is the elimination of the primary cause by the GERD treatment.

ORAL SYMPTOMS ASSOCIATED WITH GERD

Dental erosions

The association between dental erosion and GERD was reported for the first time in 1933 (13). Dental erosion (dental corrosion) is the loss of tooth surface caused by chemical or electrolytic processes of non-bacterial origin, usually involving acids (13, 14). The etiology of dental erosions is multifactorial. The acids may be of endogenous (intrinsic) or exogenous (extrinsic) origin. Gastric acids of intrinsic origin are present in the gastric acid reflux, while those of extrinsic origin come from food or drugs (12). Erosion caused by acids originating from external sources is different from the one caused by gastric acid reflux. In this case, we can notice the deterioration of the labial tooth surface of the front teeth, with a decreasing severity in the posterior area (15).

Dental erosion begins at the surface of the dental tissue, where the decalcification acid or chelating agents destroy the film, which causes the dissolution of the organic substratum of the teeth and the demineralization of their surface. The damaged dental area is exposed to all the processes that occur in the oral cavity: chewing, swallowing, brushing (16).

The "critical pH" for enamel demineralization is about 5.5. It is permanently buffered by the action of calcium and phosphate ions present in the

saliva and in the blood stream (16). Also, antacids and proton pump inhibitors decrease the production of acid in the stomach, and implicitly the gastric reflux. Thus, the potential for tooth erosion may vary depending on the composition and pH of the reflux, the buffering mechanisms, the amount of saliva, or the time between reflux and dental brushing.

The authors of a study performed on 249 patients (children and adults) reported a significant association between molar erosion and gastric reflux shown by performing upper gastrointestinal endoscopy, esophageal manometry, and 24-hour esophageal pH monitoring (17). The authors of another study performed on children in 2009 found a higher prevalence of dental erosion in children with GERD compared to the control group (18). Tofan N et al. presented a case of a young adult patient with dental erosion produced by GERD associated with frequent consume of acid foods (19).

Oral mucosal lesions

Oral mucosal lesions can result from direct contact with the gastric acid reflux. There are reports in the literature that a burning sensation of mouth, aphthae-like lesions and dysphonia appear in patients with upper digestive tract diseases (20). The authors of a study noticed a significant association of GERD with the palate and uvula mucosal erythema (21).

However, the described lesions are not specific to patients with GERD. Therefore, a differential diagnosis should be made with oral candidiasis, changes in salivary flow or drug-induced xerostomia. Also, diet changes and oral hygiene status should be noted.

Bruxism

Bruxism is characterized by the stereotypical rhythmic movement of the masticatory muscles, which causes the teeth to grind and clench (22). It is known that it is made more serious by stress, sleep disturbances, GERD and medication (23). Bruxism can occur during sleep, but also when the patient is awake. Certain published studies have reported the presence of bruxism in patients with night-time GERD, this

association being most commonly found in Caucasians (24).

this association being most commonly found in Caucasians (24).

THE PARACLINICAL DIAGNOSIS OF GERD

To determine the presence of GER, one can use: esophageal pH monitoring, impedance-pH monitoring or scintigraphy. GERD-induced lesions can be determined by performing upper digestive endoscopy.

Esophageal pH monitoring for 24 hours cannot currently be considered as the gold standard for the diagnosis of GERD because its primary limitation is that it only detects gastric acid reflux. In addition, it has a low tolerability. Impedance-pH monitoring can detect acid, weakly acidic and alkaline reflux episodes, but this technique is limited by high costs and by the fact that there is no effective treatment for weakly acidic and non-acid reflux, so the clinical relevance of measuring these types of reflux remains questionable (25). Box-Ochoa score is the most accurate score used for the interpretation of pH-monitoring in children for GERD diagnosis (26).

GERD TREATMENT IN CHILDREN

The management of GERD nowadays consists of the control of the symptomatology and its major impact on the quality of life, unlike the previous period, where healing the esophageal mucosal lesions was the main purpose. The evaluation of the response to proton pump inhibitors (PPIs) is required if we take into account the correlation of GERD with gastritis of infectious etiology and

symptomatic overlap that raises differential diagnosis problems (27).

The main therapeutic goals are: healing the lesions when present, the treatment of the non-digestive symptoms, the prevention of recurrences and of the complications of the disease. These goals are achievable by: general measures, medical treatment, and surgical treatment (27). The treatment of acid reflux is also needed in order to stop the potential for tooth erosion. Proton pump inhibitors (PPIs) are the most effective in the treatment of GERD in children. Drugs which may cause or exacerbate hyposalivation and which may lead to xerostomia should be avoided. Patients should avoid the consumption of acidic foods that may exacerbate dental erosions associated with acid regurgitation. Tooth brushing and the chewing of food and sugar-free gum should be avoided for approximately two hours after the regurgitation episode in order to allow for the restoration of the salivary film and the subsequent remineralization of the tooth surface (12).

CONCLUSION

GERD-induced dental erosions progress slowly and are often subtle, so the examination of the oral cavity by a dentist is often necessary. The late diagnosis and, implicitly, the late treatment of GERD can lead to significant deterioration of the teeth and of the mastication system. The successful treatment of GERD requires a multidisciplinary approach involving gastroenterologists, ENT specialists and dentists.

REFERENCES

1. Vakil N, Veldhuyzen van Zanten S, Kahrilas P, Dent J, Jones R. The Montreal definition and classification of gastro-esophageal reflux disease (GERD) - a global evidence-based consensus. *Am J Gastroenterol.* 2006; 101:1900–20.
2. Lupu VV, Burlea M, Lupu A et al. The gastroesophageal reflux disease in children – 5 years cases report. *RJOR.* 2012; 4(1):31-34.
3. Chen CH, Lin CL, Kao CH. Association between gastroesophageal reflux disease and coronary heart disease: A nationwide population-based analysis. *Medicine (Baltimore).* 2016; 95(27): e4089.
4. Pindborg JJ. Pathology of dental hard tissues. Copenhagen: Munksgaard; 1970. p. 312–25.
5. Asher C, Read MJ. Early enamel erosion in children associated with the excessive consumption of citric acid. *Br Dent J* 1987; 162(10):384–7.
6. Jones RR, Cleaton-Jones P. Depth and area of dental erosions and dental caries in bulimic women. *J Dent Res* 1989; 68(8):1275–8.

7. Schroeder PL, Filler SJ, Ramirez B, Lazarchik DA, Vaezi MF, Richter JE. Dental erosion and acid reflux disease. *Ann Intern Med* 1995; 122(11):809–15.
8. Barron RP, Carmichael RP, Marcon MA, Sandor GKB. Dental Erosion in Gastroesophageal Reflux Disease. *J Can Dent Assoc* 2003; 69(2):84–9
9. Farahmand F, Sabbaghian M, Ghoudousi S, Seddighorae N, Abbasi M. Gastroesophageal Reflux Disease and Tooth Erosion: A Cross-Sectional Observational Study. *Gut Liver*. 2013; 7:278–281.
10. Mihailopol CF, Lacatusu Stefan, Codreanu CM. Correlations between dental erosion severity and salivary factor in patients with gastroesophageal reflux disease. *RJOR*.2011; 3(4): 63-66.
11. Edgar M, Dawes C, O'Mullane D. *Saliva and Oral Health*. 3rd edition. London, UK: British Dental Association; 2004.
12. Campisi G, Lo Russo L, Di Liberto C et al. Saliva variations in gastro-oesophageal reflux disease. *J. Dent*. 2008; 36: 268–71.
13. Ranjitkar S, Smales RJ, Kaidonis JA. Oral manifestations of gastroesophageal reflux disease. *JGH*. 2011; 27(1): 21-27.
14. Imfeld T. Dental erosion. Definition, classification and links. *Eur. J. Oral Sci*. 1996; 104: 151–5.
15. Picos A, Chisnoiu A, Dumitrascu DL. Dental Erosion in Patients with Gastroesophageal Reflux Disease. *Adv Clin Exp Med* 2013, 22, 3, 303-307.
16. Holbrook WP, Furuholm J, Gudmundsson K, Theodórs A, Meurman JH. Gastric reflux is a significant causative factor of tooth erosion. *Journal of Dental Research*. 2009;88(5):422–426.
17. Tolia V, Vandenplas Y. Systematic review: the extra-oesophageal symptoms of gastro-oesophageal reflux disease in children. *Aliment Pharmacol Ther*. 2009; 29: 258–272.
18. Petruzzi M, Lucchese A, Campus G. et al. Oral stigmatic lesions of gastroesophageal reflux disease (GERD). *Rev Med Chile* 2012; 140: 915-918.
19. Tofan N, Andrian S, Nica I et al. Indirect restoration of erosive dental lesions: case presentation. *RJOR* 2016; 8(1): 72-80.
20. Järvinen V, Meurman JH, Hyvarinen H, Rytomaa I, Murtomaa H . Dental erosion and upper gastrointestinal disorders. *Oral Surg Oral Med Oral Pathol* 1988; 65: 298-303.
21. Di Fede O, Di Liberto C, Occhipinti G et al. Oral manifestations in patients with gastro-oesophageal reflux disease: a single-center case-control study. *J. Oral Pathol. Med*. 2008; 37: 336–40.
22. AASM. International classification of sleep disorders revised. Diagnostic and coding manual American Academy of Sleep Medicine. 2005; 4.
23. Mengatto CM, Dalberto Cda S, Scheeren B, Barres SG. Association between sleep bruxism and gastroesophageal reflux disease. *J Prosthet Dent*. 2013;110: 349–55.
24. Miyawaki S, Tanimoto Y, Araki Y , et al. Association between nocturnal bruxism and gastroesophageal reflux. *Sleep*. 2003;26: 888–92.
25. Lupu VV, Ignat A, Ciubotariu G et al. Helicobacter pylori infection and gastroesophageal reflux in children. *Diseases of the Esophagus*. 2016; 29(8): 1007–1012.
26. Lupu VV, Ignat A, Paduraru et al. Correlation between the different pH-metry scores in gastroesophageal reflux disease in children. *Medicine (Baltimore)*. 2016; 95(26):e3804.
27. Lupu VV. Boala de reflux gastroesofagian la copil, Ed. Medicala Amaltea, 2015, p. 106-123