



Evaluation of Gastro-Esophageal Reflux Disease (GERD), as a possible cause of Eustachian tube dysfunction in adults.

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Evaluation of Gastro-Esophageal Reflux Disease (GERD), as a possible cause of Eustachian tube dysfunction in adults.

BACKDOWN: *In this study, the authors, each for their own skills, on the basis of clinical, psychological, endoscopic investigations, evaluated the probable relationship between the laryngopharyngeal reflux present in gastroesophageal reflux disease, and the dysfunction of the Eustachian tube. At the end of the study, after a phase of medical therapy for GERD, they found that laryngopharyngeal acid reflux was in fact the basis of audiological symptoms and chronic dysfunction of the Eustachian tube.*

METHODS: *We evaluated with a digestive endoscopy 60 patients with symptoms of gastroesophageal reflux, who had associated pathologies of ENT relevance, probably caused by extraesophageal reflux. Following audiometric evaluations, 40 patients treated with drug therapy for reflux were selected.*

RESULTS: *Based on clinical, psychological, endoscopic investigations, and after medical therapy, acid reflux has been shown to underlie audiological symptoms and chronic dysfunction of the Eustachian tube.*

CONCLUSION: *Although limited to a small number of patients, the results obtained with our study, supported by various clinical studies in the literature, confirm the hypothesis that acid reflux may underlie audiological symptoms and therefore involved in the genesis and chronic dysfunction of Eustachian tube.*

KEY WORDS: Dysfunction of the Eustachian tube, Esophagogastroduodenoscopy, Gastroesophageal reflux disease, Laryngopharyngeal reflux

Introduction

In 2006 the Consensus Conference in Montreal, classified gastroesophageal reflux disease (GERD) as a condition that develops when gastric contents return to the esophagus, causing symptoms and possible lesions at the level of the esophageal mucosa.

GERD worldwide has an incidence between 8% and 33%, it can involve groups of all ages and both sexes.

In Europe the prevalence is between 8.8% and 25.9% with a higher prevalence in the North than in the South. The disease has an incidence of 0.84 per 1000 people. In some countries there is no association between sex and symptoms, in others such as South America, women are about 40% more likely to report symptoms than men. In contrast, men, compared to women, have a higher risk of erosive esophagitis, Barrett's esophagus and esophageal adenocarcinoma.

The highest incidence, of 20-40%, is among patients between 55 and 65 years of age, which increases significantly in the over seventies. The most common cause of GERD is abnormal function of the lower esophageal sphincter (LES), whose tone is influenced by a number of factors; Its main task is to allow relaxation after the start of swallowing and post-swallowing contraction to prevent food reflux. High-fat diets, coffee and smoking

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abuse, and conditions such as pregnancy and obesity increase the clinical and symptomatic manifestations of the disease¹.

In particular, manifestations of “extraesophageal” reflux have been associated with a variety of symptoms or diseases, such as laryngitis, pharyngitis, sinusitis, and otitis². The diagnosis of reflux disease must be absolutely interdisciplinary, given the multiplicity of organs involved, through the integration of different specialized skills. Identify all aspects of reflux disease: Your doctor should identify the most relevant symptoms, identify symptoms wrongly attributed to other causes, and rule out reported symptoms that are secondary to other diseases.

With particular regard to the involvement of the laryngopharyngeal tract, hiatal hernia is often considered an adjuvant factor for prolonged exposure of the mucosa to the gastroduodenal bolus (as suggested by the American Academy of Otolaryngology), due to an antiperistaltic mechanism of passage of the gastric bolus, which can reach the upper aero-digestive tract. According to many authors, two different mechanisms are involved that could explain this relationship. The first mechanism is due to the direct harmful action of acidic material from the stomach on the pharyngeal and laryngeal mucosa, the second involves the vagal reflex, which can be stimulated by contact of the acid bolus with the lower third of the esophagus. This reflex, represented by the pneumogastric nerve, causes inflammation of the airways characterized by hypersecretion, tracheal obstruction, pharyngeal obstruction, chronic cough³⁻⁴.

The symptoms determined by the involvement of the laryngopharyngeal tract, gastro-esophageal reflux disease, classified as extra-esophageal symptoms, are: hoarseness, dysphagia, odynophagia, foreign body sensation, drooling, pharyngeal pain, laryngeal spasm, suppurative otitis. Patients undergoing laryngoscopy show a classic picture of vocal cord edema, laryngeal hyperemia and edema, mainly localized on the interarytenoid mucosa, with salivary stagnation, and piriformis sinus granulomas of the posterior portion of the true vocal cords⁵⁻⁷.

In one of our previous articles from 2016, we examined the relationship between gastroesophageal reflux and nasal and salivary ph, showing that subsequent laryngitis and rhinitis are among the main factors contributing to coughing⁸.

There are many clinical studies in the literature, which have demonstrated the role of reflux in chronic otitis media in children^{2, 9-11}.

In this case there is a hypersecretion of mucus in the space of the middle ear that often interferes with the child's hearing, which as a result can have speech problems, even a developmental delay¹²⁻¹⁴.

Clinical studies in recent years have confirmed that gastroesophageal reflux, and in particular extraesophageal acid reflux (EER), may be the associated factor in the pathogenesis of otitis media or Eustachian tube dysfunction¹⁵⁻²⁰.

Methods

In this retrospective study, compared to our previous research¹, in which we had evaluated the presence of dysphonia, in patients with gastroesophageal reflux disease, we tried to demonstrate the relationship between extraesophageal reflux and the possible dysfunction of the Eustachian tube.

We evaluated patients undergoing esophagogastroduodenoscopy with the following characteristics:

patients of both sexes; aged >18 years; presence at the anamnesis of subjective and objective symptoms for gastroesophageal reflux disease; presence of subjective and objective symptoms of extraesophageal manifestations, in particular at the level of the ear.

We excluded patients who did not have: esophageal and extraesophageal symptoms; endoscopic investigations and negative audiometric tests; previous pathologies of the head and neck area; presence of symptoms of psychosomatic pathology.

Among all the patients who had undergone esophagogastroduodenoscopy, we selected 60 subjects, 32 females and 28 males (from 25 to 60 years), who complained of a history characteristic of extraesophageal reflux, with symptoms such as dysphagia, odynophagia and raclage, dysphonia, with a sense of auditory fullness, with significant discomfort / pain (Table I).

Endoscopic evaluation of the 60 selected patients was performed with a high-definition videogastroscope (GIF - 1TH190 with NBI Olympus, Tokyo, Japan), under conscious sedation with Midazolam 5 mg. e.v.

Endoscopic investigations evaluated in particular, in addition to the appearance of the mucosa, the height of the Z line from the dental arch and the continence or incontinence of the cardia.

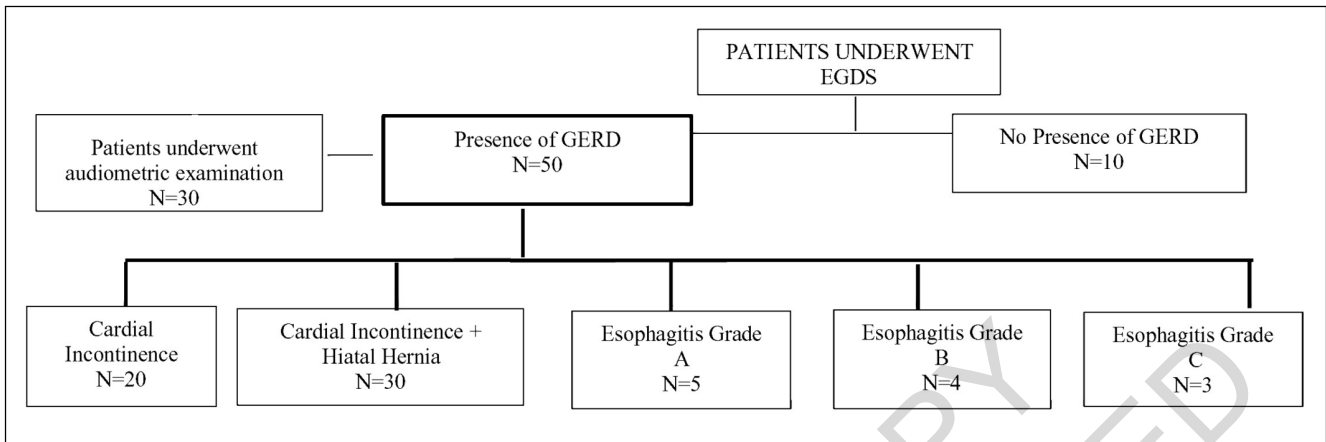
Biopsies were performed at the level of the body, antrum and gastric fundus, to search for a possible *Helicobacter Pylori* infection.

After the EGDS, which had confirmed the presence of signs of gastroesophageal reflux disease, in light of the symptoms collected at the anamnesis, we advised patients to continue the diagnostic process by carrying out an otolaryngology consultation.

TABLE I - Clinical data of patients included in the study

Patients	N. 60
Male	N. 28
Female	N. 32
Age 25-45	N. 27
Age 46-60	N. 33
Esophageal symptoms Dysphagia	N. 15 (25%)
Odinophagy	N. 5 (9%)
Extraesophageal symptoms Raclage	N. 22 (27%)
Dysphonia	N. 20 (33%)
Auditory fullness	N. 18 (30%)

TABLE II - Clinical data of patients included in the study



The patients performed an ENT examination, aimed at confirming an ear pathology, caused by reflux. In particular, an audiometric tone was performed; one with impedance audiometry (tympanometry, Eustachian tube functional test).

The purpose of the audiometric examination was to quantitatively and qualitatively assess a probable reduction or loss of hearing. In this way, the hearing threshold of patients was detected, evaluating responses by air, bone and voice test.

With the tonal examination by air the sound was sent to the headphones, the intensity levels are expressed in dB HL. The tonal bone examination was performed by sending the sounds by means of a vibrator resting on the mastoid. The comparison between the air threshold and the bone threshold is of fundamental importance to discover a dysfunction of the conduction apparatus.

Finally, the vocal tests were carried out by sending lists of phonetically balanced bisyllabic words (such as to represent in a balanced way the frequency of the sounds of the Italian language) and recording in what percentage and at what intensity the patient repeats them correctly. Following these investigations, among the 60 patients identified after EGDS and psychological and otolaryngological evaluation, only 55 subjects (30 females and 25 males) had met the criteria we had considered for our evaluation.

The organic causes that led to the exclusion of the 5 patients, were above all sensorineural and mixed hearing loss, otosclerosis, the presence of tinnitus for more than six months, maxillofacial malformations and those of the ear, in a particular case a previous barotrauma that had caused dysfunction of the Eustachian tube.

Results

Among the 60 patients selected after esophagogastro-duodenoscopy, 50 had a positive endoscopic diagnosis

of GERD, while 10 had no endoscopic signs of the disease, but had specific symptoms of the disease.

In particular, among the 50 patients positive for endoscopy, cardiac incontinence was highlighted in 20, also highlighted in retroversion with the ascent of the gastric folds, while the other 30 had a hiatal hernia in addition to incontinence (with inversion of cardio-diaphragmatic relationships, and with an ascent of the Z line between 2 and 4 cm).

Also among the 50 patients, in 12 there was esophagitis, classified according to Los Angeles, as grade A (one or more mucosal lesions no longer than 5 mm) in 5 patients, grade B (one or more mucosal lesions longer than 5 mm) in 4 patients and grade C (one or more mucosal lesions affecting two or more mucosal folds, but involving less than 75% of the circumference of the lumen) in 3 patients.

None of these 12 patients were diagnosed with Barrett's esophagus. *Helicobacter Pylori* infection was found in none of the 50 patients on histological examination, only in 15 patients was mild gastritis present, without intestinal metaplasias (Table II).

The data obtained from the ENT surveys, in particular the audiometric examination, showed conductive hearing loss (conductive gap between 25 and 35 dB for frequencies between 125 and 1000 Hz) in 35 subjects, while in the other 20 subjects, hearing was in the normal range (20 dB for all frequencies).

All 55 patients examined showed pathological tympanometrics with the Eustachian tube function test. The tympanogram amplitude was reduced in 42% of patients (type AS), while negative values (type C) were present in 58%. In 100% of the cases subjected to the functional test of the Eustachian tube, the dysfunction was confirmed.

Audiometric examination was normal in all patients, Eustachian function tests confirm dysfunction for all patients tested (Table III).

In light of the results we have obtained, with the vari-

Table III - Audiometric examination.

Audiometric examination	
conductive hearing loss	N. 35
normal hearing	N. 20
Pathological tympanometrics.	N. 55 (100%)
Pathological tests of Eustachian tube function	N. 55 (100%)
reduced tympanogram	N. 23 (42%)
negative values of the tympanogram	N. 32 (58%)

ous investigations, all 55 patients were treated with drug therapy, according to the following therapeutic scheme:

- Esomeprazole, 40 mg, taken twice daily orally, for at least 6 weeks;
- Magaldrato sachets 2 / day;
- Prokinetic before meals.

The aim of this therapy was to verify, with clinical checks at 3 and 6 weeks, whether the classical therapy for the treatment of gastroesophageal reflux disease, was able to eliminate extraesophageal symptoms, in particular that afferent to the Eustachian tube.

The results obtained with medical therapy after 3 weeks were as follows:

- all patients confirmed a slight improvement in symptoms, no patients reported a total resolution of symptoms; audiometric examination was normal in all patients; Eustachian functional tests confirmed dysfunction for all patients tested.
- At the control after 6 weeks, 38 subjects reported resolution of symptoms, 17 substantial improvements.

Instrumental tests, audiometry, tympanograms and Eustachian tube function tests, showed a resumption of tube activity. It is clear that the return to normal function of the Eustachian tube corresponds to the disappearance of audiological symptoms in 70% of patients and a marked improvement in the remaining 30%.

Discussion

As early as 1903 Coffin theorized that some laryngeal and nasal symptoms in patients with hoarseness and posterior rhinorrhea were caused by “reflux of gas from the stomach” and “hyperacidity”.

Subsequently, other authors tried to show that some pathologies such as laryngomalacia, subglottic stenosis, reflex apnea, bronchoconstriction, laryngospasm, otitis and rhinosinusitis, were certainly caused by acid reflux. The classic symptomatology of gastroesophageal reflux disease (GERD) is mainly localized at the gastrointestinal level, although in reality it has been shown that there are so-called atypical symptoms that can affect the relative ENT district through two different pathophysiological pathways:

- the first is certainly linked to vagal stimulation of the esophageal wall (distal reflux): the reflux of gastric contents causes irritation of the esophageal receptors, which

through vagal transmission causes persistent cough, ear pain, paresthesia of the pharyngolaryngeal district, and finally a pain when swallowing;

- the second way is related to the direct effect of acid reflux, which causes damage to the pharyngeal-laryngeal mucosa (proximal reflux): in this case acid reflux causes inflammatory processes at the pharyngeal and laryngeal level, with associated symptoms characterized by dysphagia, dysphonia, pain when swallowing, raclage, episodes of sleep apnea, in addition, an epithelial metaplasia with goblet cells may be associated, in these cases there is a change in pH.

It has been demonstrated, in a study by Brunworth et al.¹⁵, that laryngopharyngeal reflux may play a role in the pathogenesis of Eustachian tube dysfunction; To achieve this, they used a new pH probe, which made it possible to detect the presence of acidity in a non-liquid environment, and then performed a comparison between nasopharyngeal pH between control patients and those with Eustachian tube dysfunction. In the latter, dysfunction was more likely to occur due to a greater number of nasopharyngeal reflux events.

Thanks to numerous studies conducted by various authors, such as those described above, the relationship between pepsinogen levels and H. pylori positivity in middle ear fluid has been demonstrated. However, there are still few studies in the literature regarding otitis and reflux in adults. We are sure that many cases of otitis media in adults, and the consequent dysfunction of the Eustachian tube, are related to the problem of reflux. The ability to evaluate multiple cases of patients with reflux otitis media is necessary for a better understanding of the extent of the disease.

Conclusions

The aim of our study was to investigate the relationship between ear fullness and laryngopharyngeal reflux, in order to focus medical therapy and improve therapeutic outcomes in this patient population.

Although our study is limited due to a small number of patients, our results still support the hypothesis that acid reflux may underlie audiological symptoms and therefore involved in the genesis and chronic dysfunction of Eustachian tube.

In our study, patients treated with proton pump inhibitors and antacids had symptom resolution in 70% of cases and in 30% there was a noticeable and progressive improvement.

Riassunto

In questo studio gli Autori, ciascuno per le proprie competenze, sulla base di indagini cliniche, psicologiche, endoscopiche, hanno valutato la probabile relazione tra

il reflusso laringofaringeo presente nella malattia da reflusso gastroesofageo, e la disfunzione della tromba di Eustachio. Alla fine dello studio, dopo una fase di terapia medica per GERD, hanno scoperto che il reflusso acido laringofaringeo era infatti alla base dei sintomi audiologici e della disfunzione cronica della tromba di Eustachio.

Sono stati valutati con endoscopia digestiva 60 pazienti con sintomi di reflusso gastroesofageo, che presentavano patologie associate di rilevanza ORL, probabilmente causate da reflusso extraesofageo. A seguito di valutazioni audiometriche, sono stati selezionati 40 pazienti trattati con terapia farmacologica per il reflusso.

RISULTATI: Sulla base di indagini cliniche, psicologiche, endoscopiche e dopo la terapia medica, è stato dimostrato che il reflusso acido è alla base dei sintomi audiologici e della disfunzione cronica della tromba di Eustachio.

CONCLUSIONE: Sebbene limitati ad un numero ristretto di pazienti, i risultati ottenuti con il nostro studio, supportati da vari studi clinici presenti in letteratura, confermano l'ipotesi che il reflusso acido possa essere alla base di sintomi audiologici e quindi coinvolto nella genesi e nella disfunzione cronica della tuba di Eustachio.

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