

Aerophagia due to noninvasive mechanical ventilation: a first manifestation of silent gastric carcinoma

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Noninvasive mechanical ventilation (NIV) techniques have proven useful in treating patients with respiratory insufficiency of various etiologies. The problems most frequently associated with this ventilatory technique are the appearance of nasal and oropharyngeal dryness, pressure sores where the nasal mask touches the skin, ocular irritation due to air leakage and epistaxis. Aerophagia appears in up to half the patients with NIV and may lead to discontinuing treatment. Drugs that accelerate gastrointestinal transit, changes in the respirator settings or changing the ventilatory modality may help to ameliorate the problem. When the symptoms arising from abdominal distension due to NIV are intense and persistent, the coexistence of an underlying abdominal pathology must be ruled out. We report the cases of two patients with these characteristics in whom gastroscopy revealed gastric carcinoma. We think that patients with persistent symptoms of aerophagia that cannot be controlled by the usual measures should undergo endoscopic exploration to rule out silent gastric disease.

Key words: *Noninvasive mechanical ventilation. Aerophagia. Abdominal distension. Stomach cancer. Gastroscopy.*

Introduction

Noninvasive mechanical ventilation (NIV) techniques have proven useful in treating patients with respiratory insufficiency of various etiologies¹. It has been clearly established²⁻⁶ that NIV is indicated in neuromuscular patients, patients with thoracic deformities, obesity hypoventilation syndrome and chronic obstructive disease, as well as other diseases and situations favoring

Aerofagia por ventilación mecánica no invasiva: primera manifestación de un carcinoma gástrico silente

Las técnicas de ventilación mecánica no invasiva (VNI) han demostrado su utilidad en el tratamiento de pacientes con insuficiencia respiratoria de diverso origen. Los problemas más frecuentemente relacionados con esta modalidad ventilatoria son la aparición de sequedad nasal y orofaríngea, lesiones cutáneas en los puntos de apoyo de la mascarilla nasal, irritación ocular por fuga aérea y epistaxis. La aerofagia aparece hasta en la mitad de los pacientes con VNI y puede ser motivo de abandono del tratamiento. Fármacos que aceleran el tránsito gastrointestinal, modificaciones en la regulación del respirador y cambios de la modalidad ventilatoria pueden ayudar a mejorar este problema. Cuando los síntomas derivados de la distensión abdominal por VNI son intensos y persistentes, se debe excluir la coexistencia de patología abdominal subyacente. Presentamos el caso de dos pacientes con estas características a quienes se les realizó una gastroscopia que objetivó la existencia de un carcinoma gástrico. Pensamos que en los pacientes con síntomas persistentes por aerofagia, que no se controlan con las medidas habituales, es preciso realizar una endoscopia digestiva con objeto de descartar la existencia de patología gástrica silente.

Palabras clave: *Ventilación mecánica no invasiva. Aerofagia. Distensión abdominal. Cáncer gástrico. Gastroscopia.*

the development of respiratory insufficiency. NIV is usually well tolerated but problems related primarily to the appearance of nasal and oropharyngeal dryness, pressure sores where the nasal mask touches the skin, ocular irritation due to air leakage and epistaxis^{2,4,7} may occur. Approximately half of the patients complain of aerophagia. Most of the time the discomfort is slight and well tolerated, but in some cases gastrointestinal distension is excessive and may constitute a medical emergency or lead to the discontinuance of ventilation⁸. Treatment of the problem includes using drugs to accelerate digestive transit, adjusting the respirator settings, or changing the ventilatory modality or the respirator itself. The problem sometimes disappears a few weeks after initiating NIV⁹⁻¹¹.

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We report the cases of two patients who experienced abdominal distension after initiating treatment with NIV through a nasal mask and in whom the usual measures to ameliorate the problem failed. The intensity and persistence of the symptoms led us to perform exploration of the digestive tract, which revealed the existence of gastric adenocarcinoma. The initiation of NIV was the precipitating factor in providing clinical evidence of silent stomach cancer.

Clinical observations

Case 1

A 49-year-old nonsmoking male with a right thoracoplasty because of tuberculosis in his youth was diagnosed with chronic respiratory insufficiency secondary to a chest restriction. There was no other relevant personal history. Lung function tests were performed. Forced vital capacity (FVC) was 890 ml (39% of predicted) and basal arterial blood gas measurement showed pH to be 7.42, PaO₂ 53 mmHg and PaCO₂ 67 mmHg. Adaptation to NIV via nasal mask with a volumetric respirator was initiated in a hospital setting following the standard protocol⁴. The patient presented significant aerophagia in the first days of treatment with abdominal distension, pain which required the interruption of the nasal ventilation and occasional vomiting. Different therapeutic strategies were adopted to relieve the patient's discomfort, but without success. Treatment with drugs to accelerate intestinal transit and successive changes in the regulation of ventilator settings did not significantly improve the symptoms arising from abdominal distension. When the patient underwent exploration of the digestive tract, a mammelated gastric lesion with irregular margins was found, which biopsy revealed to be adenocarcinoma. The patient had no history of digestive symptoms such as acidity, pain or pyrosis and showed no signs of weight loss, general malaise, fever or other related symptoms. Entry of air in the stomach as a consequence of starting treatment with NIV brought on the initial symptoms prompting the decision to perform a gastroscopy, which led to an early diagnosis of malignancy. The patient underwent a partial gastrectomy. After six months of NIV treatment the patient had no further symptoms of abdominal distension and his tolerance of NIV was optimal. Basal arterial blood gas measurement at follow-up showed pH to be 7.39, PaO₂ 69 mmHg and PaCO₂ 42 mmHg.

Case 2

A 58-year old male smoker of 35 pack-years was diagnosed with chronic respiratory insufficiency secondary to sequelae of pulmonary tuberculosis (fibrothorax) in his youth. He had no history of gastrointestinal disease or any symptoms of digestive pathology. Lung function testing showed FVC to be 990 ml (44%); basal blood gas measurement showed pH to be 7.36, PaO₂ 50 mmHg and PaCO₂ 73 mmHg. He was hospitalized to initiate adaptation to NIV and began to experience discomfort arising from aerophagia two days after starting bilevel positive airway pressure treatment, with epigastric pain and a sensation of stomach fullness. Despite taking recommended therapeutic measures, which included switching to a volumetric respirator, the patient continued to

suffer discomfort, which made effective ventilation impossible. The symptoms disappeared when ventilation was discontinued. Exploration of the digestive tract was performed and revealed the presence of a polypoid lesion in the pylorus. Histological examination revealed it to be gastric adenocarcinoma. As in the first case, the passage of air to the stomach when NIV was initiated contributed to the appearance of gastric symptoms and facilitated the early diagnosis of tumor formation. The patient underwent a subtotal gastrectomy, with good postoperative outcome. In the two years since surgery, he has had no problems tolerating NIV, diurnal respiratory insufficiency is under control, and problems related to aerophagia have not reappeared.

Discussion

Aerophagia is an important NIV-related problem. In a study by Leger et al⁸, with 276 patients, 50% presented abdominal distension secondary to the passage of air to the stomach. In two patients, both diagnosed with Duchenne muscular dystrophy, aerophagia even led to the discontinuance of noninvasive ventilatory support, giving an indication of just how important the problem is.

Treatment of abdominal distension includes drugs such as domperidone to accelerate intestinal transit and adjusting the ventilatory settings^{2,8,11}. Reducing the volume released by the respirator can relieve the patient's discomfort, though at the cost of using lower insufflation pressure resulting in a certain loss of ventilatory efficiency. Peak pressure can also be regulated by increasing the pressure ramp slope on ventilators equipped with that function or by adjusting the inspiratory to expiratory flow rate. Our group has observed that changing the patient's respirator may solve the problem, given that the different devices we use can reach different peak pressures at the same flow volume¹⁰. Alternating ventilatory modalities (pressure and volume) can also help to correct problems of aerophagia. Finally, it has been documented that the problem may disappear after a few weeks of treatment, either spontaneously or because the patient has learned to handle and eliminate intestinal gas more effectively^{8,9}.

When these measures do not correct the problem, it is reasonable to rule out gastric disease before considering withdrawing the respirator or performing a tracheostomy in order to switch to invasive ventilation^{9,12}, as illustrated in the cases we report. It must be borne in mind that the passage of air to the stomach secondary to NIV may bring to light digestive symptoms caused by silent gastrointestinal problems of which the patient is unaware, as we believe occurred in our two patients. Consequently, we must exercise caution with patients we start on NIV who experience aerophagia that does not respond to the usual therapeutic measures. We consider exploration of the digestive tract to be a good practical option before

considering other ventilatory alternatives or even altogether discontinuing noninvasive ventilation. We would also recommend gastroscopy for those patients who have tolerated NIV well for a more or less prolonged period of time but who, at a given point in the course of their disease, begin to experience digestive symptoms arising from aerophagia. Symptoms may occur for logical reasons, as in the case of a patient with progressing bulbar dysfunction related to amyotrophic lateral sclerosis. However, outside of this context, such symptoms should trigger suspicion of digestive disease which would need to be ruled out. In our experience, gastroscopy is a technique that should be included in the management of abdominal distension secondary to NIV, especially when conventional therapeutic measures fail.

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