Sign of the falciform ligament revealing a silent gastric perforation in the adult due to a nasogastric tube

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ABSTRACT

Introduction: The nasogastric tube (NGT) is frequently used in oncology in patients with tumors of the oral cavity. Often mild in adults, this technique can lead to a gastric perforation which is a rare emergency surgery and of poor prognosis.

Case Report: We report an interesting case of an old lady, tracheotomized for recurrent oral tumor, and got a NGT at his admission. After five days, computed tomography (CT) scan requested for extension assessment, discovered a gastric perforation by nasogastric intubation in the absence of clinical signs on physical examination. On CT scan, we have found evidence of gastric perforation, sign of the falciform ligament, ligamentum teres sign, and pneumoperitoneum. Finally, the patient has undergone a surgical repair.

Conclusion: Computed tomography scan allows rapid diagnosis of gastric perforation though it is silent by showing pneumoperitoneum. Clinicians should systematically detect the favoring factors before insertion of NGT and think of any patient with tracheostomy with NGT and developing or not an acute abdomen in the continuations of the intubation.

Keywords: Computed tomography scan, Falciform ligament sign, Gastric perforation, Nasogastric intubation

INTRODUCTION

The iatrogenic gastric perforation is extremely rare. It is a secondary to a malposition of the nasogastric tube (NGT) or the other orogastric tubes which are frequently used in emergency, in surgery, or in intensive care unit in patients who are seriously in bad condition [1]. On the contrary, the spontaneous gastric perforation is not rare and leads to a high morbidity and mortality. The secondary gastroduodenal ulcer is often caused by excessive use of non-steroidal anti-inflammatory (NSAI) drugs, steroids and other less frequent abnormalities like cancer [1]. Other complications, such as the penetration of the tube in intracranial, tracheobronchial, esophageal aortic, were reported [2]. We present an old lady, pursued for recurrent oral cavity cancer, tracheotomized, which made a silent gastric perforation due to a nasogastric intubation. Our objective is to present the clinical and radiological characteristics by focusing on the role of the tomodensitometry to make an early diagnosis.

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CASE REPORT

A 61-year-old woman with a story of the oral cavity’s squamous cell carcinoma admitted for a local recurrent tumor. At the admission, the physical examination mentioned a mass of a budding oral cavity causing dyspnea. In Emergency, she got a nasogastric tube for food needs and tracheostomy for respiratory help. A requested CT thoracoabdominal for extension assessment was done after five days of this double intubation in the absence of the digestive clinical signs, mentioned a massive emphysema under the skin of the bilateral cervical soft parts, paraseptal emphysema. The CT scan objectified double intubation (NGT and tracheostomy tube) (Figure 1), the extra digestive air in intraperitoneal at the level of the hepatic hilum (ligamentum teres sign), of the falciform ligament, in the splenorenal space, peri-gastric, the pneumo-omentocele and of the frank peri-hepatic pneumoperitoneum (Figure 2). On the coronal and sagittal reconstructions, we individualized the distal end of the nasogastric tube in the extra luminal crossing the small curve of an iatrogenic gastric perforation (Figures 3A, B and 4). The hilum of the pneumoperitoneum exerted a mass effect over the portal vein which was expanded by 19 mm. Her uterus was increased in size (14 × 11 × 11 cm) seat of the hematometry. In addition, the scanner did not objectify the secondary location of the tumor. The patient was put in condition by hydration and they stopped feeding by NGT before the surgery since the condition was altered and finally the treatment consisted of a laparotomy. The operatory report mentioned they found a small stomach orifice on posterior face which was blocked by omentum. The wound was sutured (gastorrhapsy) and the patient was kept with an empty stomach. Then, they had done abdominal wash and submission to an antibiotic therapy without notifying any major complications in the suites close to the operation. After this, the follow-up was unknown given the period of confinement which caused the patients to return home in order to care the Covid-19 patients.

DISCUSSION

The gastric perforation is a rare surgical emergency that requires a diagnosis and immediate care. The spontaneous gastric perforations follow gastroduodenal ulcer, the inflammatory diseases, the cancers, or the metastases or trauma [3, 4]. A frequent iatrogenic cause of perforation is the esogastroduodenal fibroscopy.
whereas the gastric perforation by nasogastric tube, or intraoperative is extremely rare [3]. Esophageal or pharyngoesophageal perforation is a complication often encountered during intubation by nasogastric tube in adults, while gastric perforation is frequent in neonatology [1, 5]. Factors predisposing adults to have a gastric perforation, when placing a NGT, are depicted. This is the use of the salicylates, or NSAI, anastomosis, the metastases of the gastroesophageal cancer and fibromuscular dysplasia [1]. Lee et al. add an altered mental condition, the preexisting esogastric lesions, the association with tracheal intubation, cardiomegaly, and cervical osteophytes [5, 6]. A permanent nasogastric tube, a preexisting nasogastric pathology increases the risk of gastric perforation. Factors related to the tube are described as the nature in polyethylene, polyvinyl chloride or latex, which are responsible for erosion of the mucosa due to their rigidity, diameter, their instability, and their tendency to expand after their introduction into gastroduodenal tract [6]. Silver et al. report a high risk if a nasogastric tube is associated with a tracheal intubation [7]. Zhou et al. reveal a gastric perforation due to a cardiopulmonary resuscitation (CPR) by creation of high gastric pressure [8]. However, in our case, mainly the association with tracheotomy caused difficult passage and the condition weakened by oral cancer and malnutrition could lead to the gastric perforation by NGT. Although rare, if a gastric perforation remains unrecognized, it generates a high morbidity and mortality [8].

The posterior wall of the small curvature is the most frequent site of the perforation because this area is less elastic, has fewer mucous folds, and is relatively fixed to the gastrohepatic ligaments [9]. The intragastric air, bile with germs from the digestive tract is discharged into the peritoneal cavity. The gastric perforation must be always suspected when the patients develop an acute abdominal distention after an intubation by nasogastric tube [8]. The silent perforation progresses to a peritonitis firstly which is chemical and then to a bacterial. The signs of generalized peritonitis and rigidity are in the foreground. Once this entity is not treated in time, septic shock and death follow [9]. In our case, we find the air in the falciform ligament, along the intrahepatic round ligament, at the hilum, splenorenal space and in Morrison space (Figure 2); what the literature designates under the name of the falciform ligament and ligamentum teres signs [4]. Moreover, she had a pneumo-omentocele which confirms the posterior seat of the perforation [5]. The diagnosis is confirmed by the means of exploration in this case CT scan or X-ray, the esogastroduodenal transit (EGDT), and the upper digestive endoscopy [4, 9–11]. The front and the profile X-ray make it possible to mention the position of the distal end of the NGT and the location of the pneumoperitoneum, especially with an uplift of the diaphragmatic dome. The EGDT notes a gastric extravasation of the product of contrast (POC) with an extra-digestive free air [7].

The CT scan is an excellent imaging for the pneumoperitoneum detection indicating a perforation of a hallow organ and in this case, air can sit in any peritoneal space but with the predilection seats: perihepatic space, falciform ligament, or round ligament (Figure 2). The possibility of making the coronal, sagittal reconstructions from the axial view favoring the detection by individualizing the existence in extraluminal of the distal end of the NGT, the seat of the perforation and indirect signs namely pneumoperitoneum, the sign of the falciform ligament, that is the air in the falciform ligament, the ligament teres sign, that is air in the round ligament and the pneumo-omentocele that is to say extra digestive air and liquid that at the level of the greater omentum, indicating a perforation of a hallow organ known as sus-mesocolic. The CT scan after opacification notes an extravasation of the POC intraperitoneally and the site of perforation [7]. The scanner can specify the degree of light, moderate or massive pneumoperitoneum. In the advanced stage, the CT scan shows signs of advanced peritonitis such as peritoneal effusion.

The endoscopy has no place in the gastric perforations by NGT. It finds indication in the face of a high digestive hemorrhage on spontaneous or intraoperative gastric perforation for diagnostic or therapeutic purposes. The
endoscopy shows the exact seat of the lesion, its extent, its depth, the status of the gastric mucosa, content (blood or not), and specifies the etiology [2].

The treatment is based on emergency surgery aimed at gastrorrhaphy or primary suture of the gastric wound, abdominal wash, and broad-spectrum antibiotic therapy active on the Bacillus Gram Negatives (GNB) and anaerobes [12]. Moreover, a caution requires itself, some authors recommend stabilization of the vital state by medical treatment and hydration before performing surgery [6]. A systematic check is ruled by an X-ray after NGT first before tracheal intubation [12]. The literature recommended to place the NGT before tracheal intubation. It is wise to use non-rigid tubes of small diameter, made of silicone or a rubber to prevent the occurrence of iatrogenic gastric perforation [6].

CONCLUSION

The early diagnosis of the iatrogenic gastric perforation prevents the morbidity and mortality in this rare entity. The CT scan allows rapid diagnosis of this fatal complication. Clinicians should identify the need for insertion of NGT and weigh the same against the risks of NGT complications and take suitable precautions.

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