Idiopathic Spontaneous Pneumoperitoneum: a case description and emergency department management

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Abstract

Spontaneous pneumoperitoneum is the presence of free air in abdominal cavity, usually related with hollow organ injury. It is considered idiopathic if there are no causes identified. We present a woman's case, with no important comorbidities, who went to the Emergency Department for abdominal pain with inespecific caractheristics, with main finding of pneumoperitoneum after studies. Through radiologic Evaluation we ruled out intestinal structural compromiso and managed her case in a conservative manner with success.

Spontaneous pneumoperitoneum is the presence of free air or gas in abdominal (peritoneal) cavity, usually related with hollow-organ injury. It is considered idiopathic if there are no identified causes. We present a woman's case, with no important comorbidities, who went to the Emergency Department for abdominal pain with inespecific caractheristics, with a main finding of pneumoperitoneum after studies. Through radiologic evaluation we ruled out intestinal structural commitment and managed her case in a conservative manner with success.

Key words: Pneumoperitoneum. Conservative treatment. Emergency treatment. Intestinal perforation.

Introduction

Pneumoperitoneum is the presence of free gas in the peritoneal cavity, outside the hollow viscera, and its finding is always abnormal. The main diagnostic method is standing chest radiograph in which is possible to identify a radiolucent image just inferior to the diaphragm. Its most common cause is perforation of hollow viscus that generates peritonitis (1). However, there is a subgroup of patients whose presentation is not compatible with acute abdomen or is related to a surgical cause (iatrogenic) and is therefore considered spontaneous pneumoperitoneum. Another subgroup of patients is defined as idiopathic if no cause is identified after in-hospital studies (2).

Pneumoperitoneum is the presence of free gas in the peritoneal cavity, outside the hollow viscera, and its finding is always abnormal. The main diagnostic method is chest standing radiograph in which is possible to identify a radiolucent image just inferior to the diaphragm. Its most common cause is perforation of hollow viscus that generates peritonitis (1). However, there is a subgroup of patients whose presentation is not compatible with acute abdomen or is related to a surgical cause (iatrogenic) and is therefore considered spontaneous pneumoperitoneum. Another subgroup of patients is defined as idiopathic if no cause is identified after in-hospital studies (2).

Case report

A 60-year-old woman consulted to the emergency department for 24 hours of intermittent abdominal pain, moderate intensity, located mainly in the epigastrium but spread to the rest of the upper abdomen, mild postprandial exacerbation, related to 2 emetic episodes. The patient described a feeling of distension in the same location. She informed similar episodes of self-limiting pain for 6 months. In outpatient setting, she had a digestive endoscopy 4 months ago, without definite diagnosis. She had smoking history of 15 packs / year, cholecystectomy 8 years ago, without other pathological or surgical events. In systems review, a decrease in the number of stools was identified, without weight loss, melena or fever. At the physical examination, vital signs were normal, she was

not pale or dyspneic, without positive findings in the sensory or thoracic organs. In abdominal examination, inspection and auscultation were normal; slight pain was generated with epigastric palpation, without identifying signs of peritoneal irritation and not reproducing the pain that made her consult.

We decided to rule out intestinal obstruction and took an abdominal standing radiograph (Figure 1A), that showed a radiolucent region inferior to both hemidiaphragms, suggestive of pneumoperitoneum. We took a chest x-ray for better visualization (Figure 1B). She was hospitalized by the general surgery department.

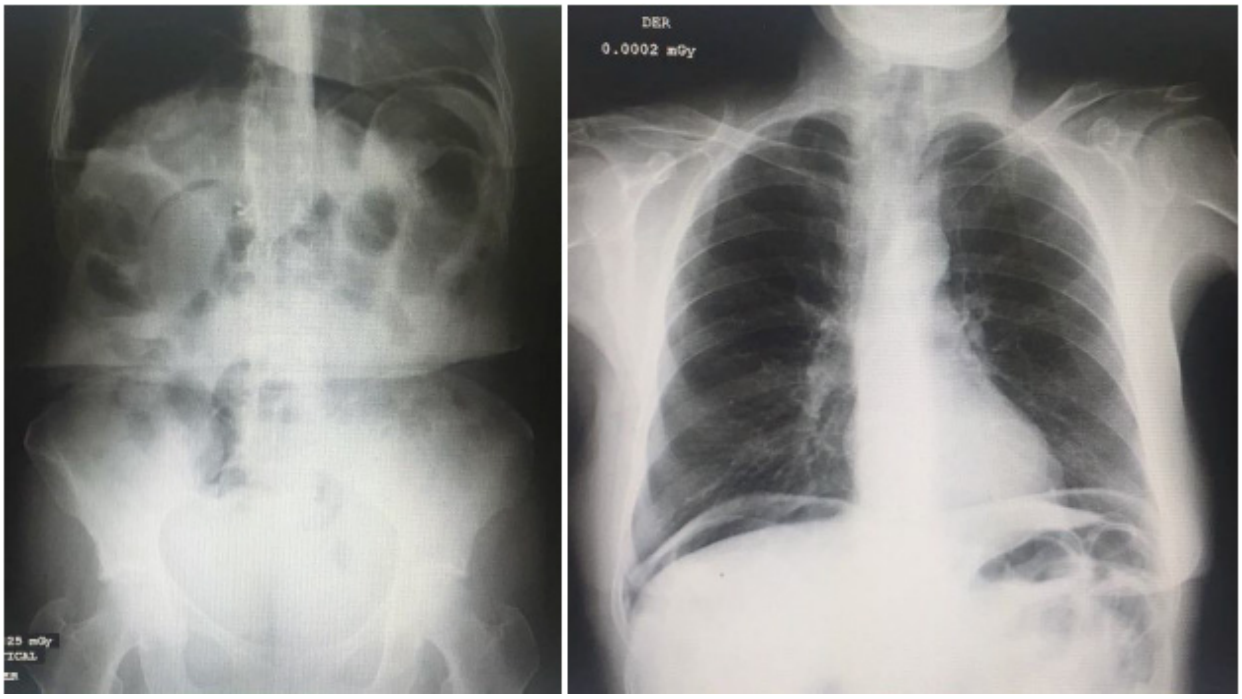
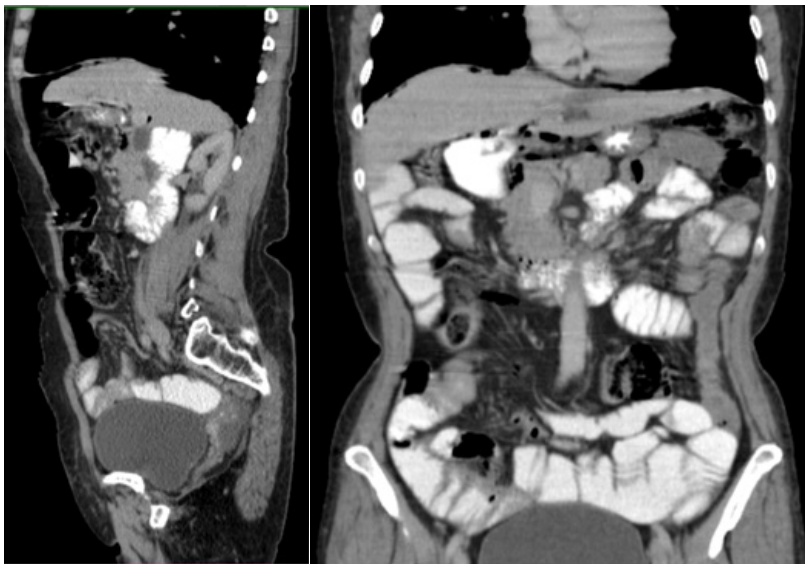


Figure 1A. Standing abdomen x-ray without obstructive pattern with image suggestive of pneumoperitoneum. Figure 1B. Standing chest X-ray confirming the presence of pneumoperitoneum.

In the interrogation, the patient denied having suffered trauma or any other procedures, other than the aforementioned endoscopy. Hemogram, electrolytes, arterial blood gases and serum lactate were normal; coproscopy no showed occult blood. We took a contrast-enhanced abdominal tomography with a General Electric equipment of 16 multidetectors (Figures 2A and 2B) and identified a pneumoperitoneum chamber without contrast leak points. During her hospitalization, she had absolute diet and antispasmodic management with improvement of symptoms (Figure 3). Her oral tolerance was tested successfully. In outpatient control she reported sporadic episodes of mild self-limited pain and chest radiograph kept showing a pneumoperitoneum chamber without changes.



Figures 2A y 2B. Abdominal tomography in sagittal and coronal views demonstrating the presence of pneumothorax and ruling out contrast leaks into the peritoneal cavity.

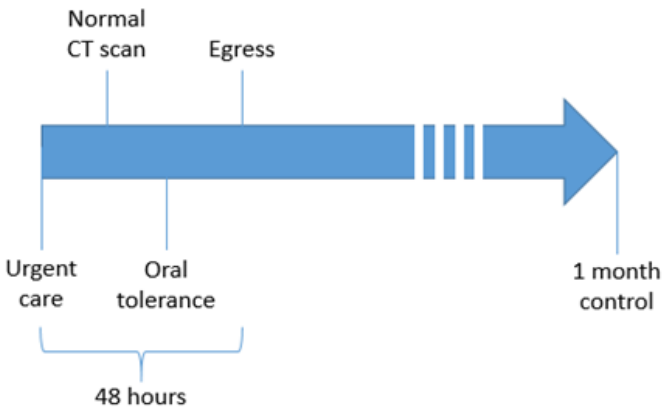


Figure 3. Timeline of events in patient care.

Discussion

Spontaneous pneumoperitoneum can be produced by thoracic causes such as pulmonary abscesses, chronic obstructive pulmonary disease, complications of mechanical ventilation, bronchopleural fistulas; abdominal causes such as intestinal pneumatosis, abdominal abscesses and infections, intestinal obstruction; pelvic causes as uterine rupture, postcoital state and postpartum exercises (2-5). See Table 1.

Approximately 90% of spontaneous cases are explained by gastric or duodenal perforations (1), however we had no findings suggestive of those in this case. In the review by Mularski et al (6) they found that most common cause was iatrogenia with a proportion of 25% due to endoscopic procedures. Please recall that patient had an endoscopy 4 months earlier, was already symptomatic by the time and notice no change in pain characteristics after the procedure. It would only make sense if assumed that pneumoperitoneum did not cause her symptoms and resulted as a benign complication of endoscopy.

Another possible explanation is that pneumoperitoneum was secondary to constipation, as in the case reported by Yamana et al (7), in which the tomography showed abundant fecal matter in colon and the exploratory laparotomy had no findings; however, that case showed clear acute course, in contrast to our case.

As mentioned, some diseases and pelvic trauma can also produce pneumoperitoneum. In the case reported by Shapey et al (10), they documented pneumoperitoneum in a patient diagnosed with pyometra. They suspected air leaking through the vaginal cavity or anaerobic metabolism from microorganisms as possible causes. In our case, no gynecological symptoms or imaging findings suggestive of this origin were documented.

Table 1. Causes of spontaneous pneumoperitoneum. Adapted from Williams et al (2).

Cause	Mechanism
Pneumomediastinum	Trauma or foreign body in the esophagus, causing pneumoperitoneum that later filters through the diaphragm.
Pneumothorax	Same as in pneumomediastinum.
Cardiopulmonary resuscitation	Blunt chest trauma secondary to chest compressions, or as a consequence of visceral perforation.
Mechanical ventilation	Volutrauma and air filtration in the perivascular and peribronchial space.
Thoracic abscess	Due to the difference in pressures between atelectasis and open alveoli.
Vaginal warm showers, postpartum, postcoital state	Through the fallopian tubes that communicate the uterine cavity with the abdominal cavity.
Pneumatosis intestinalis	Filtration through the perivascular space.

Table 2 shows all cases reported in last 10 years of pneumoperitoneum and its probable or confirmed causes. Other idiopathic cases have been reported in which conservative management was successful, given the absence of pain or signs of acute abdomen (8). In our case, discharge was decided without endoscopic or surgical interventions for same reason.

Table 2. Other causes of spontaneous pneumoperitoneum reported in the last 10 years. M, man. W, woman. HTA, arterial hypertension. DM2, type 2 diabetes mellitus. CT, computed axial tomography. BUN, blood urea nitrogen. OSA, obstructive sleep apnea. COPD, chronic obstructive pulmonary disease. CRP, C-reactive protein.

Reference	Sex, age	Presentation	Past medical history	Laboratories	Cause	Management
Eenhuis et al (11).	W, 42	Acute abdomen, shock	Hystory of 1 pregnancy and partum, treated recently for urinary infection	Leukocytosis, elevated CRP, metabolic acidosis, acute kidney injury	Spontaneous pelvic-abdominal peritonitis due to actinomyces	Antibiotics

Lewinson (4)	W, 85	No symptoms	Not reported	Not reported	Spontaneous idiopathic pneumoperitoneum	Conservative treatment
De Smet et al (12)	W, 56	Shock and cardiorespiratory arrest. Previous 2 weeks with abdominal pain	HTA, bisoprolol	Metabolic acidosis, other tests normal	Perforated duodenal ulcer	Laparotomy
Carzolio-Trujillo et al (13)	M, 21	Trauma in a traffic accident	Non	Not reported	Blunt chest trauma, Macklin effect	Conservative treatment
Peña-Ros et al (14).	M, 55	Abdominal pain and fever	DM2, Ischemic heart disease, treated tongue neoplasm	Leukocytosis, metabolic acidosis	Splenic abscess	Splenectomy and antibiotics
Kuczia et al (15)	M, 72	Mild abdominal pain in a patient with positive ventilation by tracheostomy	COPD, respiratory insufficiency	Leukocytosis, normal CRP.	Idiopathic, mechanical ventilation is suspected	Exploratory laparotomy due to suspicion of intestinal perforation
Narra et al. 2015 (16)	M, 48	Sudden abdominal pain and vomiting with signs of peritoneal irritation	DM2, hospitalized for high intermittent 6 months fever.	Leukocytosis, high creatinine and blood urea nitrogen.	Splenic abscess	Exploratory laparotomy due to suspicion of intestinal perforation
Sucandy et al. 2012. (17)	M, 65	6-week abdominal pain exacerbated with signs of peritoneal irritation	HTA and dyslipidemia	Leukocytosis, bands, creatinine and BUN elevation, hyperlactatemia	Hepatic metastases, colon primary tumor	Exploratory laparotomy
Kim et al. 2012 (18).	W, 80	Sudden and severe abdominal pain	Cholangiocarcinoma	Abdominal CT showing hepatic necrosis and perihepatic emphysema	Emphysematous hepatitis	Percutaneous drainage
El et al. 2011 (19)	W, 60	Acute abdominal pain	Immediate colonoscopy, removal of colonic polyp	Not reported	Colonic perforation after colonoscopy	Conservative treatment
Vischio et al. 2010 (20)	W, 49	Nausea, vomiting, dyspepsia	Systemic sclerosis, pulmonary fibrosis	Normocytic anemia	Pneumatosis intestinalis.	Conservative treatment
Aganovic et al. 2012 (21)	M,72	Chest pain	Not mentioned	Not mentioned	Jejunal diverticular disease	Conservative treatment
Al-Mufarrej et al. 2009 (22)	M, 20	Acute cervical pain, cervical subcutaneous emphysema	Not important	Normal	Unknown	Conservative treatment
Garrido et al. 2009 (23)	M, 66	Sudden abdominal pain and emesis. Septic shock	HTA, DM2, OSA, pancreatitis	Not mentioned	Hemorrhagic pancreatitis	Exploratory laparotomy

Conclusion

Although some authors recommend urgent surgery in all cases (9), we believe that expectant management and laboratory/imaging studies in the emergency department are prudent in cases without signs of peritoneal irritation and patients with good general state. Also having in mind the burden of morbidity and possible complications of a laparotomy.

References

1. Mann CM, Bhati CS, Gemmell D, Doyle P, Gupta V. Spontaneous pneumoperitoneum : Diagnostic and management difficulties. Case report. 2010. Dec; 22(6):568-70

2. Williams NM, Watkin DF. Spontaneous pneumoperitoneum and other nonsurgical causes of intraperitoneal free gas. Postgrad Med J. 1997. Sep;73(863):531-7

3. Law-Courter J, Frank L, Townes D. A case of spontaneous pneumoperitoneum. Am J Emerg Med. 2005;23(3):398–9.

4. Lewinson RT, Lewinson RE, Graves PS. Spontaneous pneumoperitoneum with subcutaneous emphysema. 2016;2:1–2.

5. Pitiakoudis M, Zezos P, Oikonomou A, Kirmanidis M, Kouklakis G, Simopoulos C. Spontaneous idiopathic pneumoperitoneum presenting as an acute abdomen : a case report. J Med Case. 2011. Feb; 27(5): 86.

6. Mularski RA, Sippel JM, Osborne ML. Pneumoperitoneum: A review of nonsurgical causes. Crit Care Med. 2000 Jul;28(7):2638-44.

7. Yamana I, Noritomi T, Takeno S, Tatsuya H, Sato K, Shimaoka H, Yamaguchi R, Ishii F, Yamada T, Yamashita Y. Spontaneous Pneumoperitoneum due to Constipation. Case Rep Gastroenterol. 2015 Nov 14;9(3):361-5

8. Clements WDB, Gunna BR, Archbold JAA, Parks TG. Idiopathic spontaneous pneumoperitoneum - avoiding laparotomy - a case report. Ulster Med J. 1996;65(1):84–6.

9. Rodrigues de Freitas Junior W, Malheiros CA, Kassab P, Ilias EJ. Idiopathic spontaneous pneumoperitoneum. Rev Assoc Med Bras. 2011;57(6):2011.

10. IM Shapey, T Nasser, P Dickens, M Haldar, MH Solkar. Spontaneously perforated pyometra: an unusual cause of acute abdomen and pneumoperitoneum. Ann R Coll Surg Engl. 2012 Nov; 94(8): e246–e248

11. Eenhuis LL, de Lange ME, Samson AD, Busch ORC. Spontaneous Bacterial Peritonitis due to Actinomyces Mimicking a Perforation of the Proximal Jejunum. The American Journal of Case Reports. 2016;17:616-620.

12. De Smet R, De Paepe P, Buylaert W, Idrissi SH. Spontaneous tension pneumoperitoneum presenting as an out of hospital cardiac arrest: A case report and review of the literature. Acta Clin Belg 2016;71(4):258-262.

13. Carzolio-Trujillo, Héctor Alejandro; Navarro-Tovar, Fernando; Padilla-Gómez, César Isaac; Hernández-Martínez, Iván Arturo; Herrera-Enríquez, Javier. Trauma contuso de tórax con neumomediastino y neumoperitoneo secundario a efecto Macklin. Reporte de un caso. Cirugia y Cirujanos. 2016; 84(5):409-14.

14. Peña-Ros E, Méndez-Martínez M, Vicente-Ruiz M, Sánchez-Cifuentes Á, Martínez-Sanz N, Albarracín Marín-Blázquez A. Neumoperitoneo por absceso esplénico: un reto diagnóstico. Reporte de un caso. Cirugia y Cirujanos. 2015; 83(5):433-7.

15. Kuczia M, Kurowska M, Kubica B. Spontaneous Pneumoperitoneum in a Patient After Ventilation Therapy. Polish Journal of Surgery. 2015; 86(12):601-3.

16. Narra RK, Jehendran MV. Ruptured splenic abscess causing pneumoperitoneum: a rare cause revisited. BMJ Case Reports. 2015; Mar 20.

17. Sucandy I, M.D., Gallagher S, M.D., Josloff RK, M.D., Nussbaum ML, M.D. Severe Clostridium Infection of Liver Metastases Presenting as Pneumoperitoneum. Am Surg 2012;78(7):E338-9

18. Kim JH, Jung ES, Jeong SH, et al. A case of emphysematous hepatitis with spontaneous pneumoperitoneum in a patient with hilar cholangiocarcinoma. The Korean Journal of Hepatology 2012;18(1):94-97.

19. El Ramli R, Koulaouzidis A, Godfrey H, Gasem J. Rupture of a big ovarian cyst and pneumoperitoneum post-colonoscopy and endoscopic mucosal resection. Arab J Gastroenterol. 2011 Sep;12(3):154-5.

20. Vischio J, Matlyuk-Urman Z, Lakshminarayanan S. Benign spontaneous pneumoperitoneum in systemic sclerosis. J Clin Rheumatol. 2010 Dec;16(8):379-81.

21. Aganovic L, Lee YK, Chu PK, Cassidy FH. Recurrent non-surgical pneumoperitoneum due to jejunal diverticulosis. J Emerg Med. 2012 Sep;43(3):e175-9.

22. Al-Mufarrej F, Gharagozloo F, Tempesta B, Margolis M. Spontaneous cervicothoracolumbar pneumorrhachis, pneumomediastinum and pneumoperitoneum. Clin Respir J. 2009 Oct;3(4):239-43.

23. Garrido F, Sancho E, Gasz A, Menéndez Sanchez P, Gambí Pisonero D. Pneumoperitoneum secondary to spontaneous gaseous gangrene of the pancreas due to Klebsiella sp. Gastroenterol Hepatol. 2009 Oct;32(8):585-6.