Case report
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Spontaneous Pneumoperitoneum in a Female Patient without Hollow Organ Perforation and Peritonitis

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SUMMARY

Pneumoperitoneum normally occurs due to perforation of the hollow organ of the gastrointestinal tract, which is accompanied by the development of peritonitis. Cases of free gas without perforation and peritonitis are rare. Such situations are called "nonsurgical pneumoperitoneum". This clinical case of a patient with pneumoperitoneum and no clinical picture of acute pathology in the abdominal cavity id reported in this article. Such patients should be carefully monitored by a surgeon to avoid unnecessary laparotomy.

Keywords: pneumoperitoneum, abdominal cavity, peritonitis, laparotomy

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First, we learn how to operate,
then we learn when to operate,
and at the end we learn when not to operate.
M. Shein [1]

INTRODUCTION

Pneumoperitoneum in the vast majority of patients is a consequence of perforation of the hollow organ of the gastrointestinal tract (GIT) and this condition is accompanied by the development of peritonitis, which requires surgical treatment.

Sometimes, with perforation of hollow organs, a defect of small diameter is covered by a large omentum, liver, gallbladder or other organs and is tightly soldered to the surrounding tissues due to fibrinous layers, as a

result of which the outflow of contents into the abdominal cavity stops. An objective examination in such patients does not reveal any pronounced pathological changes, and the symptoms that arise pass very quickly. However, in this case, free gas can be detected in the abdominal cavity, which gives grounds to diagnose covered perforation of a hollow organ. [2–5].

Cases of free gas in the abdominal cavity without peritonitis are rare [6, 7]. For the first time such an observation was described by *L. Rigler* in 1941 [8]. If pneumoperitoneum is not accompanied by perforation of the hollow organ, it is called idiopathic, spontaneous, or "nonsurgical" [5, 7, 9–11]. This diagnosis is made when the known causes of the condition have been ruled out and usually after negative laparotomy results.

There is a theory that explains idiopathic pneumoperitoneum by the presence of subclinical small perforations, leading to the release of gas into the abdominal cavity without the outflow of contents. This condition begins with sudden abdominal pain, which is accompanied by relatively mild general symptoms, there is almost no tension in the abdominal muscles. The diagnosis can be made based on the results of a plain X-ray of the chest and abdomen (gas under the diaphragm). Such pneumoperitoneum is characterized by a benign course and disappears after conservative treatment.

Patients with diverticular disease of the colon, complicated by perforation are described, with the presence of free gas in the abdominal cavity without peritonitis, whose diagnostic laparotomies ended in favorable outcomes [12, 13].

Pneumoperitoneum without peritonitis has also been observed in *Saint* syndrome [14]. The syndrome is named after the British and South African surgeon *Charles Frederick Morris Saint* (1886-1973), who first drew attention to the combination of diverticular disease of the colon, hiatus hernia with gallstone disease.

In women, pneumoperitoneum can also occur during ovulation and air ingress from the fallopian tubes, as well as after violent intercourse - the so-called postcoital pneumoperitoneum [6, 13, 15, 16].

Thus, according to the literature, spontaneous pneumoperitoneum is a rare condition in which surgical tactics are not fully defined.

The aim of this work is to present a clinical case of spontaneous pneumoperitoneum in a woman patient without perforation of the hollow organ and peritonitis and to show the possibility of conservative tactics in this condition with an assessment of its results (including autopsy data).

Clinical case

Woman patient M., 63 years old, was admitted on September 13, 2019 to the rheumatology department of the City Clinical Emergency Hospital No. 25 of Volgograd with a diagnosis of Rheumatoid arthritis, erosive, late clinical stage, moderate activity, radiological stage 4, functional class III, with systemic manifestations: kidney and liver damage. Hormone dependence.

Upon admission, the patient complained of joint pain, skin itching, and the presence of rashes on the skin of the trunk and extremities. Neither before nor during hospitalization the patient complained of abdominal pain. Objectively: the abdomen is of the correct shape, actively participates in the act of breathing. On palpation, it is soft, painless in all parts. On the 4th day after admission, a chest X-ray was performed, in which free gas was detected in the subdiaphragmatic space on both sides (Fig. 1).

Fig. 1. X-ray of the chest and subphrenic space of a patient M. (17.09.19). There are no focal and infiltrative shadows in the projection of the lungs. Pulmonary pattern is not enhanced. The mediastinum is not displaced. The sinuses are free. Free gas in the subphrenic space bilaterally

The patient was examined by the surgeon on duty: complaints of bloating (the day before the patient ate a lot of grapes), abdominal pain does not bother. Objectively: respiratory rate - 16 per minute, heart rate - 76 per minute, blood pressure - 120/80 mm Hg, body temperature - 36.4 ° C. There is vesicular breathing in the lungs, no wheezing. Rhythmic heart sounds. The abdomen participates in the act of breathing, on palpation it is soft, painless in all parts. There are no symptoms of peritoneal irritation. Intestinal noises are uniform, gases go away, twice a day there was a formalized chair. Clinical data for hollow organ perforation are not identified.

Laboratory research. Complete blood count: erythrocytes - 3.87 · 1012; hemoglobin - 110 g / l; leukocytes - 13.1109; (rod-nuclear - 6%, segmented - 82%, lymphocytes - 9%, monocytes - 3%); platelets - 343.0 109; erythrocyte sedimentation rate - 42 mm / h. In the biochemical analysis of blood, an increase in the content of creatinine - 152.6 μmol / L, urea - 15.1 mmol / L, uric acid - 455.5 μmol / L, myoglobin - 182.0 μg / L was noted. The values of other indicators did not go beyond the normal range. General urine analysis - no pathology.

An ultrasound examination of the abdominal cavity revealed no free fluid; free gas was determined. To exclude a perforated gastric or duodenal ulcer, the patient underwent fibrogastroduodenoscopy – mixed gastritis, duodenogastric reflux. With native (non-contrast) computed tomography of the abdominal organs, free gas is determined in the right and left subphrenic spaces (Fig. 2). No free liquid was found. In the course of the sigmoid and descending sections of the colon, unchanged diverticula are visualized. Given the severe course of the underlying disease and the absence of signs of an inflammatory process in the abdominal cavity, it was decided to refrain from an emergency diagnostic operation in favor of dynamic observation.

Fig. 2. Computed tomography of the abdominal organs of patient M. (17.09.19). Free gas in the abdominal cavity

The patient was repeatedly examined by a surgeon (no dynamics) and a gynecologist (no pathological changes were found) over the next 3 days. X-ray examination of the organs of the chest and abdominal cavity (twice): the picture is the same (free gas in the abdominal cavity) without dynamics. After a course of conservative treatment of rheumatoid arthritis (prednisone, suprastin, omeprazole) on the 11th day (09/23/19), the patient with the previous diagnosis was discharged for outpatient treatment. Urgent re-hospitalization to the rheumatology department on October 20, 2019 due to severe pain in the articular syndrome. At the time of admission and during the entire period of the patient's stay in the hospital, pain and discomfort in the abdomen did not bother the patient. The abdomen remained soft, painless in all areas. X-ray examination of the lungs and subphrenic space showed no signs of pneumoperitoneum (Fig. 3).

Fig. 3. X-ray of the chest and subphrenic space of patient M. (22.10.19). No focal and infiltrative shadows were found. Unaltered pulmonary pattern. The roots of the lungs are not dilated, the sinuses are free. No signs of pneumoperitoneum

Against the background of treatment, on the 7th day of hospitalization, progression of symptoms of the underlying disease was noted with the development of multiple organ failure, from which the patient died.

Autopsy revealed a late clinical stage of rheumatoid arthritis of a high degree of activity with damage to the kidneys (like diffuse glomerulonephritis), liver (interstitial hepatitis), lungs (thrombovasculitis with the formation of single hemorrhagic pulmonary infarctions), polyneuropathy. There is no effusion in the abdominal cavity. In the region of the descending colon, spherical protrusions of a rounded shape, up to 0.7 cm in diameter, filled with compacted feces were determined. A targeted pathological examination of the abdominal organs of the covered perforation of the hollow organ showed no signs of the postponed inflammatory process. Macroscopically and histologically, pathological changes in internal organs that could be associated with the occurrence of pneumoperitoneum were also not found.

CONCLUSION

The presented case shows that the detection of free gas in the abdominal cavity is not always an absolute indication for laparoscopy or laparotomy. In the absence of a clinical picture of peritonitis, the patient must be under the close supervision of a surgeon with the necessary repeated diagnostic examinations of the abdominal organs, which helps to avoid unnecessary surgical intervention.

REFERENCES

1. Schein M, Rogers PN, Leppäniemi A, Rosin D. *Schein's Common Sense Prevention and Management of Surgical Complications*. Shrewsbury: TFM Publishing Ltd; 2013.
2. Alassaf M. Recurring spontaneous aseptic pneumoperitoneum presenting secondary to an unrelated chief complaint: A case report. *Int J Surg Case Rep*. 2015;7C:96–98. PMID: 25603306. https://doi.org/10.1016/j.ijscr.2014.10.038
3. Britt CI, Christofordis AJ, Andrews NC. Asymptomatic spontaneous pneumoperitoneum. *Am J Surg*. 1961;101(2):232–235. https://doi.org/10.1016/0002-9610(61)90760-7
4. Daly BD, Guthrie JA, Couse NF. Pneumoperitoneum without peritonitis. *Postgrad Med J*. 1991;67(793):999–1003. PMID: 1775427 https://doi.org/10.1136/pgmj.67.793.999
5. Sidel N, Wolbarsht A. Spontaneous pneumoperitoneum from an unknown cause. *N Engl J Med*. 1944;231:450–452. https://doi.org/10.1056/NEJM194409282311303
6. Dodek SM, Friedman JM. Spontaneous pneumoperitoneum. *Obstet Gynecol*. 1953;1(6):689–698. PMID: 13063842
7. Hoover EL, Cole GD, Mitchell LS, Adams CZ Jr, Hassett J. Avoiding laparotomy in nonsurgical pneumoperitoneum. *Am J Surg*. 1992;164(2):99–103. PMID: 1636904 https://doi.org/10.1016/s0002-9610(05)80363-0
8. Rigler LG. Spontaneous pneumoperitoneum: a roentgenologic sign found in the supine position. *Radiology*. 1941;37(5): 604–607. https://doi.org/10.1148/37.5.604
9. Madura MJ, Craig RM, Shields TW. Unusual causes of spontaneous pneumoperitoneum. *Surg Gynecol Obstet*. 1982;154(3):417–420. PMID: 7038948
10. Williams NM, Watkin DF. Spontaneous pneumoperitoneum and other nonsurgical causes of intraperitoneal free gas. *Postgrad Med J*. 1997;73(863):531–537. PMID: 9373590 https://doi.org/10.1136/pgmj.73.863.531
11. Wright AR. Spontaneous pneumoperitoneum. *AMA Arch Surg*. 1959;78(3):500–502. https://doi.org/10.1001/archsurg.1959.04320030144025
12. Butorova LI. *Divertikuljarnaja bolezn' tolstoj kishki: klinicheskie formy, diagnostika i lechenie*. Moscow: 4TE Art Publ.; 2011. (in Russ.).
13. Schein M, Rogers P, Assalia A. (eds.) *Schein's Common Sense Emergency Abdominal Surgery*. 3rd ed. Berlin Heidelberg: Springer-Verlag; 2009.
14. Kalymbetov RB, Abuov SM, Zharmenov SM Artykbaev AZh, Kalymbet AB. Saint triad as a rare cause of the presence of free gas in the abdominal cavity without peritonitis. *Vestnik KazNMU*. 2014;(2):244–245. (in Russ.).
15. Freeman RK. Pneumoperitoneum from oral-genital insufflation. *Obstet Gynecol*. 1970;36(1):162–164. PMID: 5422082
16. Tabrisky J, Mallin LP, Smith JA. Pneumoperitoneum after coitus; a complication due to uterine tube prolapse after vaginal hysterectomy. *Obstet Gynecol*. 1972;40(2):218–220. PMID: 5047956

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