



# PRIMARY PNEUMOCOCCAL PERITONITIS IN A HEALTHY WOMAN: CASE REPORT AND A LITERATURE REVIEW OF THE LAST 10 YEARS

## PERITONITE PNEUMOCÓCICA PRIMÁRIA EM MULHER SAUDÁVEL: RELATO DE CASO E REVISÃO DA LITERATURA NOS ÚLTIMOS 10 ANOS

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### ABSTRACT

Primary peritonitis usually occurs in patients with comorbidities but very rarely can also occur in healthy patients. These rare cases have been published in increasing number and have higher incidence in women. This article refers to the case of a previously healthy 47-year-old woman who presented to the emergency room with acute abdomen, fever, and diarrhea that rapidly progressed to septic shock. She underwent exploratory laparoscopy, converted to laparotomy in attempt to exclude an intra-abdominal septic focus. Only purulent peritonitis with fibrin-purulent membranes was observed and the diagnosis of primary peritonitis was assumed. Peritoneal liquid culture revealed *Streptococcus pneumoniae* and then adjusted antibiotic therapy was started. There was postoperative clinical improvement. A systematic review of all PubMed published cases of primary peritonitis in healthy adults from 2008 to 2018 was performed, comparing demographic data, clinical presentation, imaging findings as well as their treatment and respective outcome.

**Keywords:** *primary peritonitis; Streptococcus pneumoniae; case report*

### RESUMO

A peritonite primária geralmente ocorre em doentes com co-morbilidades mas muito raramente também pode ocorrer em doentes saudáveis. Estes casos têm sido publicados em número crescente e com maior incidência nas mulheres. Neste artigo, descrevemos o caso de uma mulher previamente saudável, de 47 anos de idade, que se apresentou ao serviço de urgência com abdómen agudo, febre e diarreia, tendo evoluído rapidamente para choque séptico. Foi submetida a laparoscopia exploradora, convertida para laparotomia na tentativa de excluir um foco séptico intra-abdominal. Foi apenas observada uma peritonite purulenta com membranas fibrino-purulentas pelo que se assumiu o diagnóstico de peritonite primária. Foi isolado *Streptococcus pneumoniae* no líquido purulento colhido, tendo nessa altura iniciado antibioterapia dirigida. Verificou-se melhoria clínica pós-operatória. Foi ainda realizada uma revisão sistemática de todos os casos publicados na PubMed de peritonite primária em adultos saudáveis, de 2008 a 2018, comparando os dados demográficos, a apresentação clínica, os achados imagiológicos bem como o seu tratamento.

**Palavras-chave:** *peritonite primária; Streptococcus pneumoniae; relato de caso*



## INTRODUCTION

Primary peritonitis constitutes less than 1% of peritonitis and spontaneous bacterial peritonitis usually occurs in patients with associated comorbidities<sup>1</sup>. Without an identifiable intra-abdominal source primary peritonitis is extremely rare in healthy individuals; it is commonly seen in cases of nephrotic syndrome, cirrhosis and end-stage liver disease, ascites, immunosuppression, and inflamed peritoneum due to pre-existing autoimmune and oncological conditions<sup>2</sup>.

The vast majority of surgical patients with peritonitis suffer from secondary peritonitis due to perforation of hollow viscera or leakage from an intestinal anastomosis. In these cases, surgical clearance of the infectious focus is the treatment of choice. In contrast, patients with primary peritonitis rarely require surgery and the mainstay of treatment is antibiotic therapy<sup>3</sup>.

The mechanism of primary peritonitis is not completely understood, but increased translocation of intestinal bacteria, retrograde inoculation of genital-urinary tract or hematogenous infectious routes have been implicated<sup>3</sup>.

Historically, primary peritonitis has been predominantly caused by Gram-negative bacteria, but lately an increase of Gram-positive bacteria including *Streptococcus pneumoniae* has been observed<sup>3</sup>. The most frequently isolated organisms are Gram-negative bacteria (60%), including *E. coli* and *Klebsiella pneumoniae*. Gram-positive cocci are isolated in about 25% of the cases, with *Streptococcus* being the species most frequently isolated<sup>4</sup>.

Pneumococcal peritonitis is a relatively uncommon manifestation of *Streptococcus pneumoniae* infection, but potentially life-threatening. It requires prompt medical attention and treatment with antibiotics and, in some cases, surgery.<sup>5</sup> Several epidemiological studies have indicated that group A *Streptococcus* infections are increasing in incidence and are becoming more severe in presentation.<sup>6</sup>

## METHODS

The case report was described following the SCARE recommendations<sup>7</sup>.

Pubmed searching in the English literature for “primary peritonitis” in title/abstract and mesh term, published from 2008 to 2018 revealed 63 articles. Articles about pediatric population (15), about adults with comorbidities such as chronic liver disease, chronic kidney disease and immunocompromised patients (9), without any case report (19) and about animals (2) were excluded.

18 articles were included. A systematic review of the case reports was performed comparing demographics, clinical presentation, radiologic imaging, treatment and outcome and presented in the following Table 1.

## CASE REPORT

A healthy 47-year-old female presented in the emergency room with two days of severe diffuse abdominal pain, fever of 39°C and watery diarrhea. There were no abnormal vaginal discharge or dysuria, recent travel history, contact with animals or any medications. She was a smoker and had a uterine fibroid. Her medical and family histories were unremarkable.

On physical examination she was conscious, alert and well oriented. Normal blood pressure, tachycardia and oxygen saturation was 100% on room air. Diffuse pain and rebound tenderness upon abdominal palpation.

Laboratory findings revealed hemoglobin 14,1 g/dL, C-reactive protein 28,6 mg/dL, white blood cell count 16800/mm<sup>3</sup> and normal lactate. Abdominal computed tomography scan showed a large amount of free fluid in the peritoneal cavity (mostly in pelvis), parietal thickness of small bowel, no free air or any abdominal source of infection (Figures 1, 2 and 3).

To exclude pelvic inflammatory disease a gynecology consultation was arranged. A vaginal



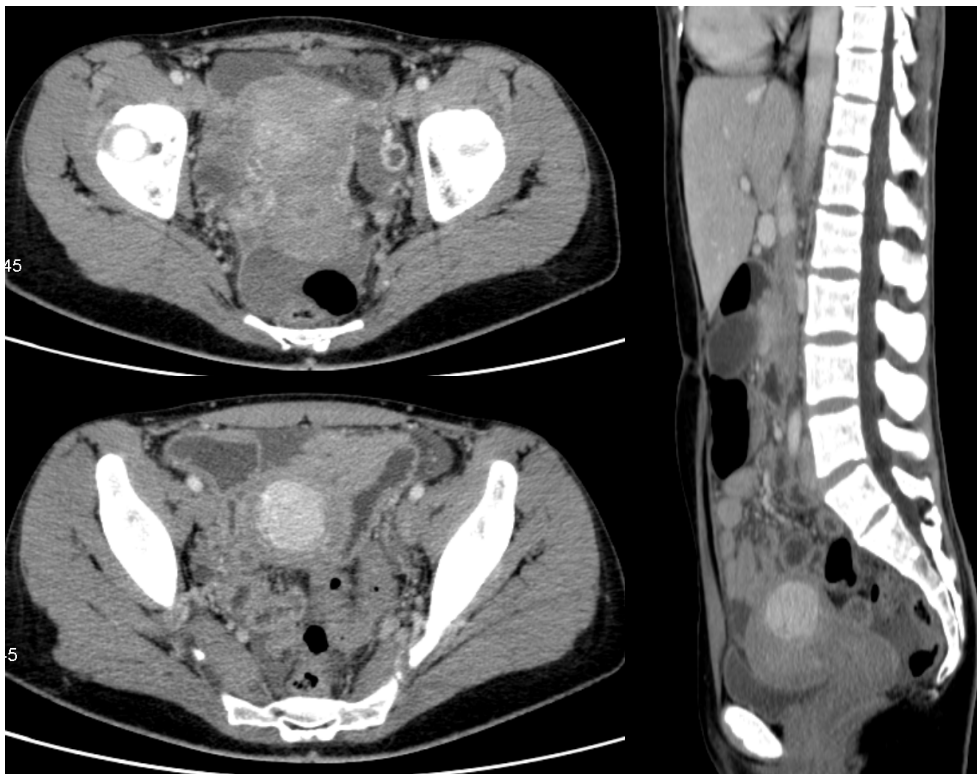


FIGURE 1, 2 AND 3 – Abdominal and pelvic computed tomography scan at admission, showing a large amount of free fluid in the peritoneal cavity (mostly in pelvis), parietal thickness of small bowel, no free air or any abdominal source of infection.

examination and transvaginal ultrasound showed no abnormalities. Due to progressive clinical deterioration an exploratory laparoscopy was performed and revealed purulent generalized peritonitis with diffuse fibrinopurulent membranes and without any obvious intra-abdominal source. Laparoscopy was converted to laparotomy, but no intra-abdominal infection focus was identified. Intra-abdominal fluid was collected for culture, peritoneal lavage and drainage were performed.

A diagnosis of primary peritonitis was made, and amoxicillin/clavulanic acid and doxycycline was started. Blood and intra-abdominal fluid cultures showed *Streptococcus pneumoniae* and penicillin-G was initiated. The patient made an excellent recovery and was discharged on the 10th postoperative day. After 2 years the patient is well and without any complaints.

## RESULTS OF PUBLISHED CASE REPORTS AND CASE SERIES

Of the 24 included cases, young women were predominantly affected (female: male ratio of 22:2). The median age was 35 years [range 21-60 years]. All cases had acute abdomen on admission. Most had fever and 38% toxic shock syndrome. Most patients underwent abdominal-pelvic computed tomography scan (CT), which most often revealed minimal amount of intra-abdominal fluid, without other specific changes.

Most of cases had undertaken surgical treatment to exclude secondary peritonitis: 11 exploratory laparotomy, 7 exploratory laparoscopy and 3 initially laparoscopy converted to laparotomy. Only 3 cases were undertaken only antibiotic therapy.

Initially broad-spectrum empirical antibiotic therapy was used in most cases, and changed after cultures results. In 54% of the cases group A



TABLE 1 – Demographic characteristics, symptoms on admission, imaging method and treatment

Author	Year	Sex	Age	Acute abdomen	Fever	Other	Imagiologic findings	Surgical Intervention	ATB 1 st	ATB after diagnosis	Cultures	Discharge (days)	Source of infection
Doloy <sup>8</sup>	2008	F	35	+	+	Chills	US: ascites and small adhesions	Laparoscopy	CIP	CTX + OFX + MTZ	<i>Streptococcus pyogenes</i> (ascites)	21	Unknown
Elkassem <sup>9</sup>	2008	F	21	+	+	Vomit Diarrhea Chills	-	Laparotomy	N/A	N/A	<i>Fusobacterium necrophorum</i> (ascites)	30	Unknown
Lelyveld-Haas <sup>10</sup>	2008	F	28	+	+	STTS	N/A	Laparotomy	TZP	N/A	GAS (Blood)	10	Vaginal?
Thomas <sup>11</sup>	2009	F	37	+	+	Vomit STTS	CT: intra-peritoneal fluid	Laparotomy	N/A	CLI	<i>Streptococcus pyogenes</i> (Blood, ascites, cervical swab)	N/A	Pharyngitis
Tilanus <sup>5</sup>	2010	F	39	+	+	STTS	CT: psoas thickness and intra-abdominal fluid	Laparotomy	AMI + CLI + GEN	PEN G	<i>Streptococcus D-hemolytic</i> (Blood + ascites)	N/A	Unknown
Monneuse <sup>12</sup>	2010	M	35 (23-43)	N/A	2:5	N/A	CT: intra-peritoneal fluid	Laparotomy	Broad spectrum	AMX + CLI	GAS (Blood + ascites)	27,5 (13-09)	2 Fasciitis 3 Unknown
		F											
		F											
		F											
Haap M <sup>13</sup>	2010	F	27	+	-	STTS	CT: Edema of small bowel wall and intra-abdominal colitis	Laparotomy	TZP	CIP + MTZ	<i>Streptococcus D-hemolytic</i> (Blood)	12	Unknown
Legras <sup>14</sup>	2011	F	23	+	+	STTS	CT: intra-peritoneal fluid	Laparoscopy	CRO + MTZ + LVX	AMP	GAS (fibrinous membranes)	9	Pharyngitis
Park <sup>1</sup>	2012	F	29	+	+	-	CT: thickness of small bowel wall and intra-abdominal fluid	Laparoscopy	SAM	PEN G + MTZ	<i>Streptococcus pyogenes</i> (blood, ascites, cervical swab)	16	Pharyngitis
Kaneko <sup>15</sup>	2015	F	28	+	+	Diarrhea STTS	CT: intestinal edema + infiltrations in the pelvis	-	MIN + CMZ	PEN G + CLI	GAS (blood)	19	Unknown
Malota <sup>3</sup>	2015	F	23	+	+	-	N/A	Laparoscopy	TZP	N/A	<i>Streptococcus D-hemolytic</i> (blood+ascites)	N/A	Unknown
		F	34	+	N/A	STTS	CT: intestinal edema;	Laparotomy	CFZ + MTZ	IPM + VAN	Gram + cocci (blood+ascites)	58	Unknown
		F	36	+	+	Pharyngitis Petechiae	CT: free intra-abdominal fluid	Laparotomy	TZP	N/A	GAS (blood+ascites)	56	Pharyngitis
Terzi <sup>16</sup>	2016	M	32	+	N/A	Nausea Vomit	CT: free intra-abdominal fluid	Laparotomy	CIP + MTZ		<i>Streptococcus anginosus</i> (ascites)	6	Oral flora?
Abellán <sup>17</sup>	2016	F	60	+	+	Septic shock	CT: free intra-abdominal fluid	Laparoscopy	Broad Spectrum	N/A	<i>Streptococcus pyogenes</i> (ascites)	10	Unknown
Yokoyama <sup>18</sup>	2016	F	40	+	+	Numbness extremities; STTS	CT: free intra-abdominal fluid	Laparotomy	AZM + MEM	PEN G + CLI	GAS (vagina)	106	Vaginal?
Iwata <sup>19</sup>	2017	F	66	+	+	STTS	CT: small-bowel dilation + mild fluid in pelvis	-	MEM	SAM + CLI	<i>Group A streptococcus</i> (blood)	N/A	Vaginal?
Litaka <sup>20</sup>	2017	F	26	+	+	Femoral pain	CT: free intra-abdominal fluid US: paracentesis	-	MEM	PEN G + CLI	<i>Streptococcus pyogenes</i> (blood+ ascites)	24	Unknown
Drexel <sup>3</sup>	2018	F	42	+	+	-	CT: free pelvic fluid	Laparoscopy	CIP + AZM	DOX	<i>Mycoplasma hominis</i> (ascites)	23	Unknown
Varela <sup>21</sup>	2018	F	59	+	+	Vomit, Diarrhea	CT: free intra-abdominal fluid, densification of mesentery	Laparoscopy	CIP + MTZ	CFX + CLI	<i>Streptococcus pyogenes</i> (blood)	NA	Pharyngitis
Our case	2019	F	47	+	+	Diarrhea Septic shock	CT: free pelvic fluid	Laparoscopy followed by Laparotomy	TZP	PEN G	<i>Streptococcus pneumoniae</i> (ascites)	10	Unknown

AMI – ampicillin; AMP – ampicillin; AMX – amoxicillin; ATB – antibiotic; AZM – azithromycin; CFZ – cefazolin; CIP – ciprofloxacin; CLI – clindamycin; cefmetazole (CMZ); CRO – ceftriaxone; CT scan: computed tomography scan; CTX – cefotaxime; DOX – doxycycline; GAS – Group A streptococcus; GEN – gentamicin; IPM – imipenem; LVX – levofloxacin; MEM – meropenem; MIN – minocycline; MTZ – Metronidazole; N/A – Not applicable; OFX – ofloxacin; PEN G – penicillin G; SAM – ampicillin-sulbactam; STSS – streptococcus toxic shock syndrome; TZP – piperacillin-tazobactam; US: ultrasonography; VAN – vancomycin.



streptococcus (GAS) were isolated in cultures. In the last ten years *Streptococcus pneumoniae* causing primary peritonitis was only presented in our case. In most patients the source of infection remained unclear. Among those with confirmed sources, ascending vaginal infections and pharyngitis were the most frequent.

## DISCUSSION

The small number of published cases reflects the rarity of this pathology, although it is underestimated. The vast majority of the patients are previously healthy women.

Immediate surgery and removal of the infectious focus is critical in the treatment of secondary peritonitis, and delayed surgery may aggravate the clinical status and recovery of these patients.<sup>22</sup> Therefore exploratory laparotomy despite negative radiologic imaging is well-accepted treatment option in septic patients.

Most often in a previously healthy patient the suspicion of secondary peritonitis is higher, which explains the high rate of exploratory laparotomies in cases of primary peritonitis.<sup>5</sup>

Due to higher incidence in woman, the female genital organs are thought to be a possible route of infection. In our case her source of infection was unclear because gynecological examination was normal.

It is controversial, whether surgical exploration and lavage of the abdominal cavity is beneficial or detrimental for patients with primary peritonitis. One could assume that the removal of infectious ascites and reduction of intra-abdominal bacterial load support the healing process. However, in cirrhotic patients with spontaneous bacterial peritonitis surgery does not improve the course of

the disease. It is likely that surgery may carry more risks than benefits for primary peritonitis treatment, and the mainstay therapy is antibiotics.<sup>22</sup> Any septic patient needs to be treated initially with broad-spectrum antibiotics promptly and once results of cultures are available, antibiotic therapy adjusted accordingly.<sup>3</sup>

Surgical intervention was crucial in establishing the diagnosis for the majority of patients, and it is also required formally to exclude secondary peritonitis, which is far more common than primary peritonitis. For most authors this cases demands exploratory laparotomy.<sup>11</sup> Nevertheless there is no formal recommendation to contraindicate laparoscopic route of access, and there are recent reports that showed that laparoscopy permitted to explore the entire abdominal cavity and exclude secondary peritonitis.<sup>1,3,4,8,14,17,21</sup> When laparoscopy fails to rule out secondary peritonitis a conversion to laparotomy can be necessary in some cases.<sup>12</sup>

## CONCLUSION

Pneumococcal peritonitis is a rare type of primary peritonitis that can easily be mistaken for secondary peritonitis. It should be a diagnosis considered in healthy young people, especially women, who are septic with diffuse abdominal pain with imaging that excludes signs of secondary peritonitis.

The standard treatment is the fastest possible start of antibiotic therapy. Although surgical treatment is usually not required, it may be necessary to exclude secondary peritonitis.<sup>3</sup>

The major challenge for the surgeon is to consider this diagnostic hypothesis and avoid laparotomy in order to search for a hypothetical secondary septic focus, even when it is not apparent on laparoscopy.





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