

# Primary Peritonitis—A Forgotten Entity

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## Abstract

### Keywords

- ▶ primary peritonitis
- ▶ peritonitis
- ▶ ascitic fluid
- ▶ laparoscopic
- ▶ appendix

Primary peritonitis is a rare phenomenon in modern antibiotic era. A case of pediatric primary peritonitis is presented here, in which a child presented with complaints of abdominal pain, vomiting for one day. Abdominal examination showed marked tenderness and guarding, diagnosis of appendicitis was made and laparoscopic appendectomy done. Later, ascitic fluid analysis and appendix histopathology proved it to be a case of primary peritonitis.

## Introduction

Primary peritonitis is an infection of the peritoneal cavity not directly related to other intra-abdominal abnormalities.<sup>1</sup> Its prevalence was around 10% of all pediatric abdominal emergencies, in preantibiotic era. Recent studies have shown incidence of less than 1 to 2% of pediatric abdominal emergencies and is rarely diagnosed preoperatively.<sup>2</sup> Antibiotics with gram-negative spectra, exploratory laparotomy with appendectomy were the hallmarks of therapy in the past, now replaced with broad-spectrum antibiotic, laparoscopic exploration with or without appendectomy.<sup>3</sup>

## Case Report

A previously healthy 14-year-old boy was brought to the emergency department with complaints of continuous diffuse abdominal pain, one episode of diarrhea and vomiting for one day. Child was also anorexic with poor oral intake. He was hemodynamically stable. Physical examination of abdomen revealed diffuse tenderness with positive rebound sign. Gut sounds were audible with normal auscultation of the chest. Laboratory investigations revealed normal blood white blood cell count. Urine dipstick, blood glucose, and renal function testes were normal. Abdominal X-ray (→ Fig. 1A) showed no air under the diaphragm. Some gut loops were seen distended on X-ray abdomen. Impression of appendicitis was made. Child was kept NPO with intravenous hydration. Laparoscopic appendectomy was

done and broad-spectrum antibiotics were continued in postoperative phase. During laparoscopy, bowel was run to find out Meckel diverticulum, but it was not found. All quadrants of abdomen were examined thoroughly to find out any primary focus but nothing was found except straw-colored ascitic fluid, 50 mL of which was sent for laboratory analysis. Ascitic fluid results showed leucocyte count of  $25 \times 10^9/L$  with neutrophil predominance. Culture showed no growth of organism. Histopathology of appendix showed no inflammatory changes (→ Fig. 1B), proving it to be a case of primary peritonitis. Child made uneventful recovery following laparoscopic appendectomy and was later discharged after completing course of broad-spectrum antibiotics.

## Discussion

Primary peritonitis is defined as spontaneous, diffuse peritoneal infection with or without intra-abdominal source.<sup>4</sup> Changes in incidence, mortality, mean age of patient, and bacteriology has been observed over the past few decades.<sup>4</sup> It accounts for approximately 10% of pediatric abdominal emergencies in the 1920s.<sup>5</sup> In postantibiotic era, incidence decreased dramatically. Between 1950s and 1970s, a marked decline in the incidence of primary peritonitis was observed.<sup>2</sup> Literature search showed approximately 2% of abdominal emergencies accounts for primary peritonitis in the past few years.<sup>3</sup> Although it can occur at any age but is more frequently observed between the ages of 4 and

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**Fig. 1** (A) X-ray of abdomen shows no gas under diaphragm. Some dilated gut loops are visible. (B) Sections reveal appendix with normal mucosa. No significant inflammation of muscularis propria or serosa is seen.

9 years. Mean age of incidence increased over the period of years. Gross reported 58 cases in 1950 with mean age of 2 years.<sup>6</sup> Fowler series (1965–1970) reported 14% of cases younger than 12 months.<sup>2</sup> Kimber and Hutson (1989–1994) reported 26 patients, all older than 2 years.<sup>7</sup> Ofori-Kuma et al reported 70% of children with primary peritonitis with ages between 6 and 10 years.<sup>8</sup> Primary peritonitis is rare in adult population.<sup>9</sup> It is more common in females as compared with males.<sup>2</sup> Children with medical disorders such as nephrotic syndrome, liver cirrhosis, and immunodeficiency are more susceptible.<sup>6,10</sup> Hematogenous, lymphatic, gastrointestinal, and genital/fallopian tubes (females) are the possible routes of infection. Urinary tract and intra-abdominal foreign body are other possible routes of infection.<sup>11</sup> Rarely, healthy children can also develop primary peritonitis, as in our case.<sup>2,3</sup> Patients of primary peritonitis usually present with abdominal pain, fever, diarrhea, or vomiting. Examination reveals diffuse abdominal tenderness, rebound tenderness, and guarding, most of the time, as in this case. Culture shows growth of single organism in more than 90% of cases. Common organisms grown in ascitic fluid culture are *Streptococcus pneumoniae*, *Escherichia coli*, and *Klebsiella pneumoniae*. An unusual cause is *Staphylococcus aureus* accounting for 2 to 4% of primary peritonitis, in one series. Anaerobes and microaerophilic organisms are also sometimes reported.<sup>12</sup> *Neisseria gonorrhoeae*, *Chlamydia trachomatis*, *Mycobacterium tuberculosis*, or *Coccidioides immitis* may also be the cause occasionally. Primary peritonitis with culture-negative ascitic fluid is a rare phenomenon, as in our case. Diagnosis is based on history, physical findings, and laboratory studies. Peritoneal fluid leukocytes count of more than  $0.5 \times 10^9/L$  with neutrophil predominance and positive-gram stain is diagnostic.<sup>13</sup> Peritoneal fluid pH of less than 7.35 and lactate more than 2.8 mmol/L is also helpful in diagnosis. Other causes of acute abdomen, especially acute appendicitis and perforated ulcer must be excluded, as in this case normal histopathology of appendix and normal appearance of other abdominal structures on laparoscopy

exclude other causes. Antibiotic therapy is the mainstay of treatment. A broad-spectrum antibiotic covering both gram-positive and gram-negative organisms is used until culture results are reported. Third generation cephalosporin are usually started empirically and changed according to the culture report, later. Improvement in condition should be observed within first 24 hours of start of antibiotic. Some authors recommend appendectomy, others be against removing a healthy organ.<sup>11</sup> Peritoneal lavage can be considered, it reduces bacterial load in ascitic fluid.<sup>14</sup> Laparoscopy is safe and preferred technique in suspected cases of primary peritonitis, and is used in our case too.<sup>7,15</sup> Laparoscopy is safer than laparotomy with fewer complications, however debridement is difficult with laparoscopy.

## Conclusion

Primary peritonitis is rare phenomenon since the advent of antibiotics. Its frequency is still declining. Ascitic fluid analysis is diagnostic. Response to antibiotic is good. In suspected cases, ascitic fluid should be tested before proceeding to surgical procedure. Appendectomy is controversial. Overall morbidity and mortality is low.

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## Conflict of Interest

None.

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